ELECTRICAL REVIEW

January 24, 1947

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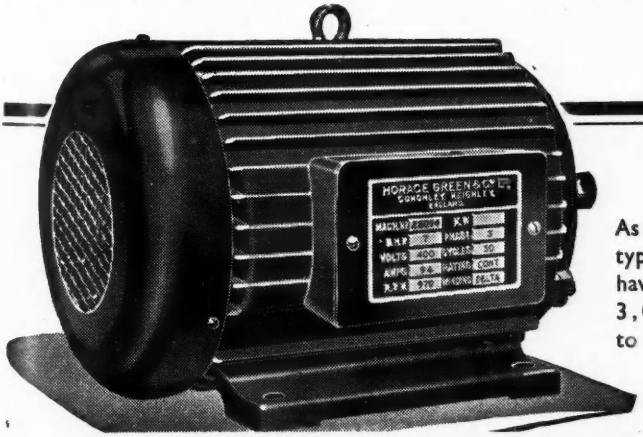

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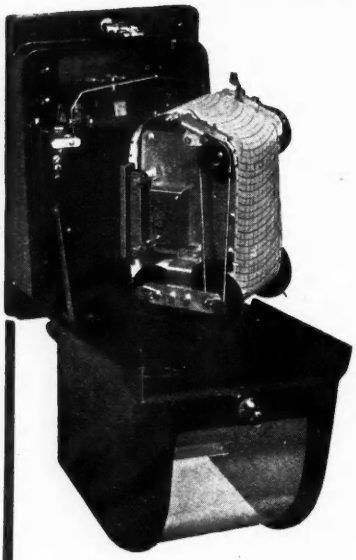

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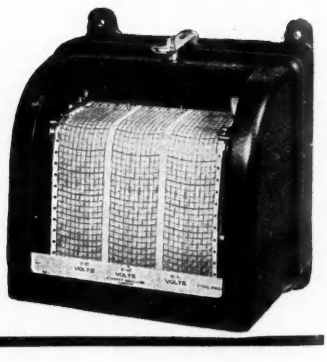

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Potential Danger

Implications of the " Manufacturing Clause "

ELECTRICITY supply is one thing: electrical manufacturing is another. Until the advent of the new Electricity Bill few people had considered the possibility of their being lumped together as they are by Clause 2 in which the proposed Central Authority is given power to manufacture " electrical plant and electrical fittings."

It has been suggested that too much importance should not be attached to the clause: that it is only a weapon to be held in reserve against any " recalcitrance " on the part of the manufacturers. Nevertheless, as we pointed out last week, such a clause must create uncertainty and mistrust at a time when confidence is particularly desirable.

Economic Production

There are several points from which to view this matter. First, it may be asked, how can a new Authority starting from scratch ever hope to produce plant and fittings on economical lines? And unless production is economic it will militate against the success of a scheme which, to justify its authors, must lower the cost of generating and consuming electricity.

It need hardly be said that the State could not set up side by side with the existing electrical manufacturing industry an organization to conduct the necessary research, design, development work, production and testing. An organization of this kind must evolve over a period of many years.

Naturally the answer to this would be that such is not the intention. If it became necessary to take up the manufacture of plant the Central Authority would by negotiation, or maybe by further legislation, acquire an existing concern or concerns to which it would hand over all its contracts. But this would be no easier than manufacture by the Board itself. The acquired concerns would have to be a very substantial part of the industry and the effect upon this country's position would be disastrous.

Export Aspect

Electrical manufacturing is one of the great exporting industries and since the war has assumed greater importance. At the moment it is not difficult to dispose in overseas markets of almost anything available but these conditions will not last; indeed some observers profess to have seen signs of an early return of active competition.

Experience has taught that export trade can be pursued successfully only if it is based on a substantial home market. A possible alternative is subsidization but that is ruled out by our obligations under the post-war international trade arrangements. In any event subsidies lead to retaliation and exclusive tariffs which are what the world is trying to avoid.

It is inconceivable that a Government-operated section of the industry, even with a secure home market, could succeed in overseas countries against well-organized competitors and we do not think that any Government would contemplate such an endeavour. But if a Government organ-

ization took away from the rest of the electrical manufacturing industry a substantial part of their home orders it would also ruin their ability to export. The country cannot afford to lose any export trade, particularly if it comprises, as most electrical exports do, a high proportion of inventive ingenuity and technical skill.

We may be accused of raising bogeys, but nothing is impossible and a word in season may deter the Government from going beyond reasonable bounds. Clause 2 (3) (*a*) must be dropped entirely or qualified by unambiguous safeguards against its misuse.

Gas-Turbine Locomotive

INVESTIGATIONS into the application of the gas-turbine to railroad traction referred to at the last annual general meeting of the G.W.R. by Lord Portal the chairman, are now taking shape. In this issue is described an electric locomotive fed by a gas-turbine-driven generator. Expected advantages are small space and weight, reliability, low maintenance costs (due to virtual elimination of rubbing surfaces and absence of reciprocating motion) and independence of water. Fuel consumption should be very much lower than for a steam engine especially non-condensing, though not so good as for a Diesel. The latter, however, uses a more expensive grade of fuel and costs much more for lubrication. It is claimed that only a straight electric locomotive could give a better performance within the loading gauge and axle limits specified.

Inventors and Taxation

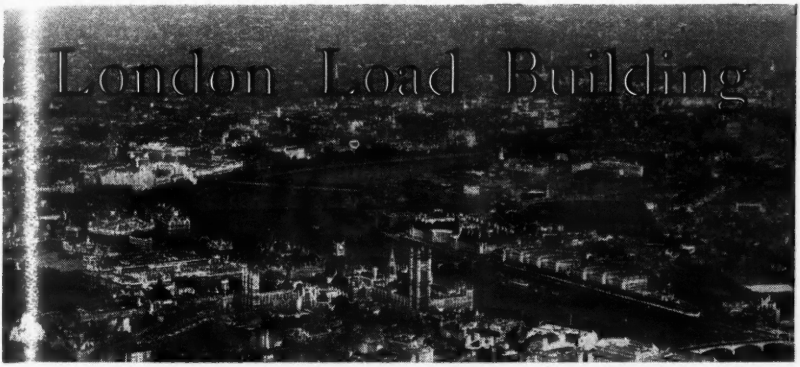
THE attention of the Chancellor of the Exchequer is constantly being drawn to the stultifying effect of heavy income tax on enterprise and ingenuity. An interesting correspondence in the *Financial Times* discloses a curious anomaly in the treatment of scientific research organizations and individual inventors. One correspondent points out that the Finance Acts of 1944 and 1945 have made provision for allowances for tax purposes of expenditure on scientific research in any trade, and in respect of acquisitions of patents and inventors' rights. Another correspondent shows that, whereas formerly an individual inventor could sell his invention and generally retain the whole of the proceeds, treating it as a capital sum, the Income Tax Act, 1945, now makes the whole of the sum so received subject to tax. Whilst we know that under modern scientific research systems most inventions are the result of collective work within organizations, many inventions in the past have been the inspiration of individuals and it would seem that individual inventive genius has received marked discouragement as a result of present legislation.

Codes of Practice

A STANDARD of good practice for the electrical equipment of buildings is provided by the I.E.E. Wiring Rules. Installations that comply with these are recognized as meeting all normal requirements, more especially for domestic and commercial premises. Regarded as a guide to installation work, they suffer from their very comprehensiveness and also from the meticulous phrasing necessary to exclude the possibility of misinterpretation from the legal angle. These drawbacks have been very largely removed in the electrical series, as issued so far, of the Codes of Practice, which were initiated by the Ministry of Works in 1942 with the aim of co-ordinating the requirements of the various building services. The two most recent examples of these Codes, relating to general installation work and wiring systems, provide excellent examples of adaptation of means to ends.

Installation Engineering

THESE Codes of Practice are, in effect, guides as to how the I.E.E. Wiring Rules ought to be applied. They bring together related points from the different Rules and express them clearly and much more readably in the guise of advice, in which the word "shall" is replaced by "should" except where "must" is clearly necessary. As the Codes have been drawn up by members of the I.E.E. Wiring Rules Committee, consistency is ensured. Although each Code is limited in its scope, it nevertheless covers more ground than does the original, as, for instance, in the section of No. 3.6 relating to the choice and lay-out of high-voltage switchgear in factories and its associated protective apparatus. The early publication in final form of No. 3.6 and its closely related 3.63 is most desirable.



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II—Transmission to Very Heavily Loaded Areas

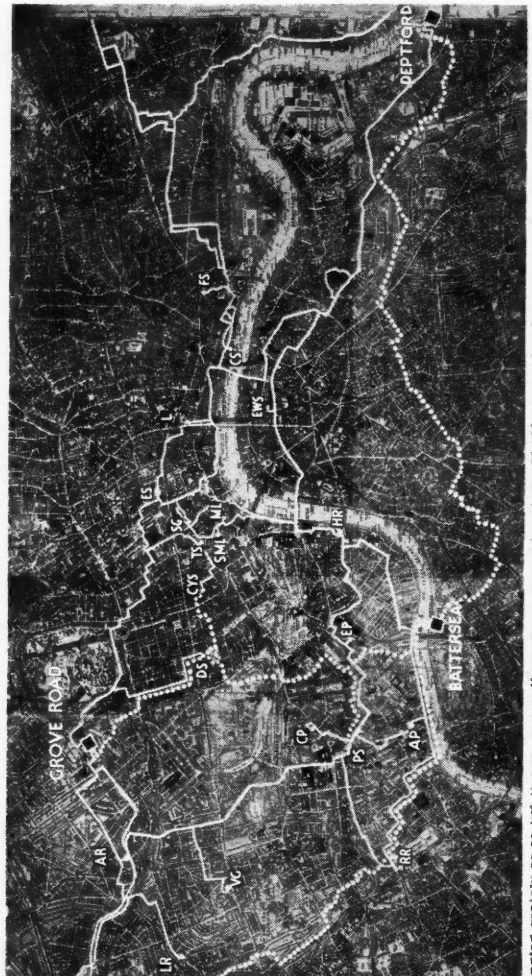
FOLLOWING the first article of this series in the *Electrical Review* of January 3rd 1947, in which we outlined the generation background to the supply of electricity to a very large area of both Inner and Greater London, we now propose to show how the load from the power stations is transmitted in bulk to the key points throughout the area for distribution to consumers. From the load-building viewpoint the major interest in the transmission scheme lies in its evolution to meet the ever increasing electrical requirements of the population of Greater London.

The importance of the long-term view is emphasized by the facts that space in London roadways is very limited and excavation costs are very heavy, often involving considerable heading work, so that if the excavation costs are to be kept to a minimum the maximum power requirements from the system must be allowed for in the design stages. Good load building can only be carried out on a basis of sound and far-sighted engineering. Some alleviation of the cable-laying problems can be obtained in certain cases by the installation of ducts, allowing some spreading of capital costs, but the rating of a cable in a duct is seriously reduced, as compared with a cable laid direct. The limitation of the power that can be transmitted on account of soil heating is a factor which influences the design of a main transmission scheme; others are the initial provision of adequate cross ties on the lower-voltage (22-kV) system, and the sectionalization of the network to keep down the short-circuit duties of the switchgear as the loads increase.

In stressing the importance of the long-term view, we are not ignoring to-day's special difficulties which might, in some cases and from certain angles, give the impression of load building "in reverse." The load builder must, however, look beyond these difficulties and correlate the present position with that of the future. We believe it will be difficult to find a better example of the vision displayed in building up a system than that contained in the following story relating to the work of the London Power Co., Ltd., in association with its constituent undertakings.

In this special instance, with the particular object we have in mind, we propose to treat our subject largely historically, so as to emphasize the evolutionary aspect which is reflected so strongly to-day in the Power Company's policy of continuity of transmission development. Before the formation of the London Power Co., by an Act of 1925, there had been a certain amount of co-operation between the original companies. For instance, the Westminster and St. James' Companies had promoted the Central Electric Supply Co. which built and operated the Grove Road power station. Later they took the Chelsea Company into a junior partnership and also gave a supply to the Kensington & Knightsbridge Co. All these new primary supplies were at 6 kV. The Kensington & Knightsbridge and Notting Hill Companies had at an earlier date pooled their resources and built the Wood Lane power station which supplied the systems of these two companies at 5·5 kV.

At the same time the Metropolitan Electric Co., operating the Willesden power station, had established a 22-kV transmission scheme by which Willesden power originally served the



Output from Battersea is handled mainly at 66 kV (transmission lines shown dotted) and the 22-kV system has become a major h.v. distribution network. (Letters indicate bulk supply substations)

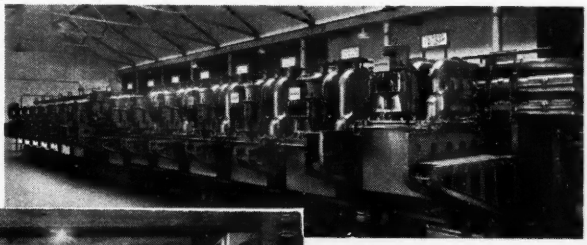
area west of Willesden and was later taken to the Paddington area at Amberley Road. This was further extended to the Holborn area at Eagle Street, near Red Lion Square. This scheme supplemented the old 10-kV. 2-phase, 60-cycle supply. As the new 22-kV transmission cables passed the Grove Road station the Metropolitan and Central Electric undertakings came to an arrangement whereby the cables were looped into the Grove Road station, so that the two stations could provide mutual stand-by supplies in emergencies. Thus, when the London Power Co. was formed and took over the responsibility for all the generation and primary transmission in the larger area, there was a certain amount of interlinking and a rather rudimentary nucleus of a 22-kV interconnection scheme.

The Charing Cross Co., serving part of the City and part of the West End, had remained entirely separate with the rather remote Bow power station supplying at 10·5 kV, 50 cycles. This company also had some 22-kV cables laid which were operating at 10·5 kV.

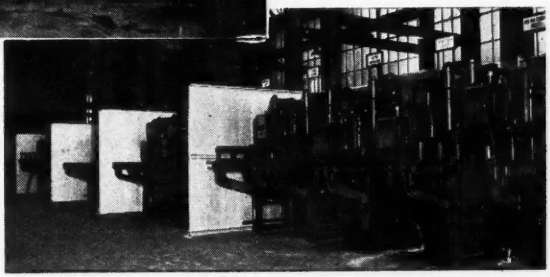
There were thus in 1925 four 50-cycle stations — Willesden, Grove Road, Bow and Wood Lane, with Willesden and Grove Road interconnected at 22-kV. There were also a number of non-standard stations, including the Deptford station of the London Electric Supply Corporation, generating at 11 kV and 6·6 kV, 25 cycles, 3-phase; 6·6 kV, 25 cycles, single-phase; and 10 kV, 85 cycles, single-phase. At

Horseferry Road there was some 400-V d.c. generating plant, while the Chelsea Company had a small Diesel-driven d.c. station, and the Brompton & Kensington Co. an oil-fuel fired steam station generating at 2 kV, 83·3 cycles, single-phase.

It was decided first to interconnect the three major 50-cycle stations—Willesden, Grove Road and Bow—and to lay down a 22-kV transmission and high-voltage distribution network to connect up the 50-cycle distribution stations throughout the area. This provided a foundation for future development and permitted the closing down of the smaller and inefficient stations at Wood Lane, Horseferry Road and Brompton. A frequency changeover was necessary on the local network at Brompton.



By the end of 1928 the greater part of the 22-kV interconnection had been effected, entailing the installation of 22-kV switchgear at Amberley Road (above), Shorts Gardens (left) and Horseferry Road (below) substations



The first new 22-kV substation in this programme was commissioned at Pelham Street (shown as P.S. on the accompanying map), and by the end of 1928 the greater part of the 22-kV interconnection had been effected. This work entailed the provision of new 22-kV switchgear and transformers at the following generating and distributing stations: Willesden, Amberley Road, Brompton, Grove Road, Tower Street, Shorts Gardens, St. Martin's Lane, Horseferry Road, Pelham Street, Ludgate, Cannon Street, Fenchurch Street, Bow and Lancaster Road. Space for switchgear and transformers was exceedingly limited in all these stations, so that, as is still the case to-day, care was taken to select equipment requiring the minimum overall space, compatible with sound engineering. About 120 miles of cable was laid in this major interconnection scheme, and in addition about 50 miles was changed over from 10·5 kV to 22 kV.

During the autumn of 1927 the Willesden and Grove Road power stations were paralleled as a normal and permanent measure, and this was followed in 1928 by the inclusion of the Bow Station in the scheme. At about the same time a control centre for the whole system was established at Horseferry Road. When the Thames overflowed its banks in 1928 the Bow Station was flooded and had to go "off-line" completely, but supplies to the Charing Cross area were maintained as the result of the recently completed interconnections.

While this interconnecting work was going

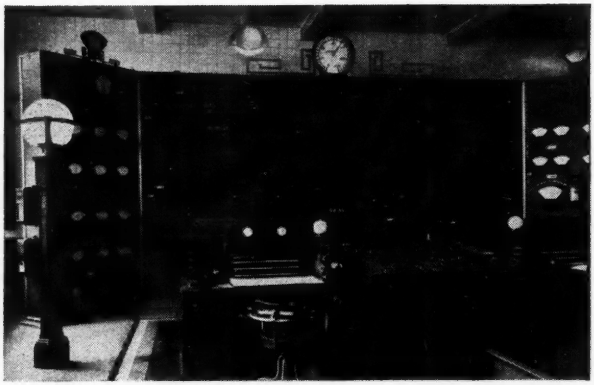
on arrangements were being made for building the new Deptford West power station, which was designed for switching at 22-kV, with direct transmission to the City and West End. For this transmission two routes were chosen —one to Horseferry Road and one to the Charing Cross area. This involved laying four cables direct to Horseferry Road and four others to various substations in the City.

Deptford West was started up in 1929, and three 22-kV sub-stations were commissioned in connection with the new supplies, all associated with the London Electric Supply Corporation which was then commencing a 50-cycle distribution system. The new substations were Ewer Street (E.W.S.), Spa Road (S.R.) and Stowage, near the Deptford power station. This was the position in 1930.

Space for switchgear was exceedingly limited in most of the substations; a 22-kV installation in an early railway-arch substation

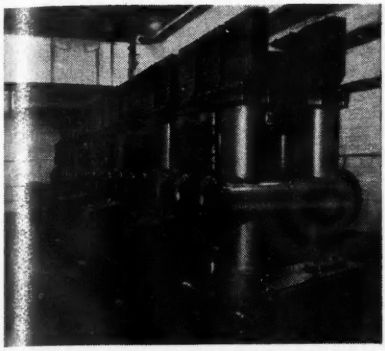
No sooner was Deptford West in commission than the Battersea power station was planned. It was decided that the Battersea output should be handled mainly at 66-kV, and that the 22-kV network would in time become regarded as a major high-voltage distribution network fed from an "overlaid" 66-kV transmission system based on Battersea. Simultaneously with the Battersea development came the Central Electricity Board's scheme which called for interconnections at Willesden, Deptford West and Battersea with the 132-kV grid system. In the next few years the 22-kV system was extended and modified to give 22-kV supplies to additional substations hitherto fed from the older lower-voltage system. Carnaby Street, Duke Street, Eccleston Place, Cheval Place, Victoria Gardens and Alpha Place were in this way all afforded supplies at 22 kV.

From the Battersea power station three groups of 66-kV mains were laid, embracing two cables to Deptford (later a third was added), two to Willesden and three to Grove Road. Originally all these feeders terminated on the transformers at the far ends. Two groups of 22-kV feeders were also laid and fed from step-down transformers at Battersea — one to Horseferry Road and the other to Alpha Place, Brompton and Cheval Place.



Central control scheme for the whole system at Horseferry Road

About this time it was decided to lay additional cables from Deptford West to north of the Thames, through a new tunnel under the river for connecting up with the existing 22-kV transmission system between Bow and the City. This reduced the necessity for the running of the Bow power station. The developments



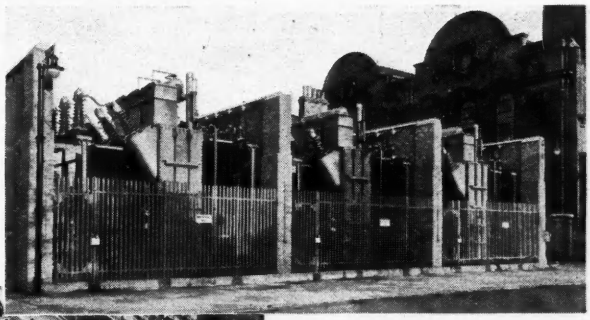
New 66-kV switchgear installed at Carnaby Street

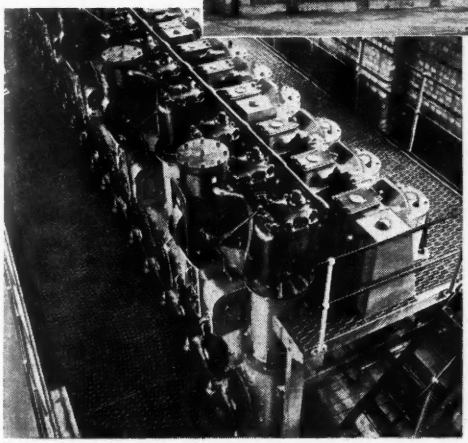
from this time (1933) up to the beginning of the war represent another definite stage in the growth of the system. The Battersea-Deptford interlink remained, but the group of three feeders to Grove Road was modified to a somewhat considerable extent.

Two new 66-kV feeders were laid to a new switching and transforming station at Pelham Street, and a new feeder was laid from Pelham Street to Grove Road transforming station which was equipped with 66-kV switchgear.

One of the Battersea to Grove Road feeders was looped into the new 66-kV transforming station at Duke Street, a second one was looped into a new 66-kV transforming station at Carnaby Street, a 66-kV cross tie was laid between Carnaby Street and Duke Street, and 66-kV switchgear was installed in Duke Street and Carnaby Street. A third feeder was laid between Battersea and Willesden, and this was eventually looped in by the Metropolitan Company to the new transforming station on this undertaking's network at Uxbridge. This scheme involved the installation of new 66-kV switchgear at Uxbridge and Willesden. A second feeder was then laid between Willesden and Uxbridge jointly by the London Power Co. and the Metropolitan Co.

A point of interest which may be made here is the favourable influence of improved cable ratings on the route costs, consequent on advancement in cable design. All the original 66-kV cables were rated at 30 MVA,





The last development phase up to the war required new 66-kV transformers and switchgear (left) at Grove Road

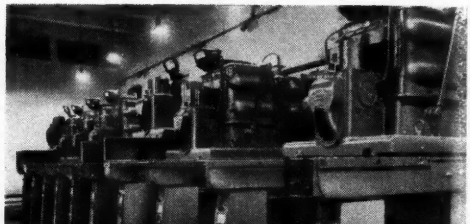
but the London Power Company is now considering the employment of 50-MVA impregnated pressure cables.

As far as possible the company dispenses with 66-kV switchgear in the transforming stations, because of the high costs and space difficulties involved. Some of the 66-kV single-break equipments were of novel design when they were installed. A proposed scheme of standardization of 66-kV feeding points involves a single 66-kV, 50-MVA feeder, possibly impregnated

pressure type, connected through metalclad isolating links to two 25-MVA, 66/22-kV transformers, the necessary cross linking between the stations being effected at a pressure of 22 kV.

The only 22-kV development in the last period referred to was the looping-in of the Willesden to Amberley Road cables to give a supply to the new distributing station at Old Oak Common serving the G.W.R. electrification scheme. This distributing station (O.O.C.) has since been extended to deal with London Transport supplies on the Denham scheme. The foregoing story brings us up to the war period.

The following schemes are in hand or envisaged for stiffening up the 66-kV and 22-kV networks during the next four or five years:—A third 66-kV feeder between Battersea and Willesden generating stations; three 66-kV cables between Battersea and Hammersmith, to be continued by the Metropolitan Company to a new transforming station at North Hyde off the Great West Road; a 66-kV cable to Brompton and a 66-kV cable to Alpha Place from Battersea, together with further 22-kV cables between Brompton, Alpha Place and Amberley Road; three 66-kV cables from a point on the Battersea–Deptford feeders to St. Martin's Lane, Shorts Gardens, and a new substation in the City, entailing the provision of a large switching station in or near the Southwark area; a 66-kV feeder between Battersea and Gypsy Corner, to be continued to Uxbridge by the Metropolitan Company; looping in of a Cannon Street to Fenchurch Street 22-kV feeder to a new transforming station at John Street for the supply to be given to the L.N.E. Railway; looping-in of the Horseferry Road–Pelham Street 22-kV feeders into the Eccleston Place substation; two 22-kV feeders from a new step-down transformer at Battersea to the Horseferry Road substation; looping the Horseferry Road to Shorts Gardens feeders into the Mason's Yard substation; a fourth feeder between Deptford West and Stowage; and looping the Pelham Street to Amberley Road 22-kV feeder into the Victoria Gardens substation.



In the new C.L.E. substation at St. Martin's Lane, replacing the old one destroyed by enemy action, is installed the Power Company's 22-kV switchgear, which is controlled by the larger board in the control room below

In order to feed a new substation in Cambridge Heath Road for a bulk supply to the Bethnal Green Corporation it will be necessary to loop in two of the existing Bow to West End 22-kV feeders. The above projected schemes will involve the laying of about 50 miles of 66-kV cable, part of which will be of the impregnated pressure type, and about 30 miles of 22-kV cable, with considerable switchgear installations.

We are indebted to Sir Leonard Pearce, engineer-in-chief and chief executive officer of the London Power Co., Ltd., for the co-operation of his staff in the preparation of this article and for permission to publish it.

Views on the News

Reflections on Current Topics

I CONSIDER the *Manchester Guardian's* criticism of the E.D.A. Memorandum on the Simon Report on Domestic Fuel Policy is unfair. The Memorandum stated the case for electric heating; the *Guardian* says that "if the electricity supply industry were prepared to step into the breach, and heat the houses, there might be something in its contention that the fuel required would be better directed to its own boilers." "But," it goes on, "what becomes of the oft-reported story that present electrical supply difficulties are as much due to shortage of generating plant as of coal?" This indicates short-sightedness. Because of temporary plant difficulties is the domestic consumer to be restricted to the burning of raw coal (even though it be in improved appliances) for ever?

* * *

The *Guardian* also takes a very narrow view of the possibilities of electric heating when it says that the Simon Report is mainly concerned with the problem of warming the whole house "instead of a small semi-circle round the grate." It seems from this that regard is paid only to the electric fire. Convectors, panel and tubular heaters, and (for the larger house) the electrode boiler are entirely ignored as means of giving warmth throughout a room or whole house. In America, it is pointed out "electricity is practically never used for space heating"; but American fuel conditions—cheaper and more available coal, oil and natural gas—are very different from ours, or at least they have been so far, although there are signs of change.

* * *

An example of the popular misapprehension regarding the difference between kW of plant capacity and the kWh it generates comes from Southport. A local councillor is reported by the *Southport Guardian* to have said that the power station is idle for long periods while the town draws supplies from the grid and shares in the cuts. The station is, I understand, operated all-out during peaks and shut down only after the evening peak is over and is again in commission before the morning load comes on. Presumably, if this procedure were not adopted fuel stocks in the area would be consumed more rapidly, probably resulting in the curtailment of supply for a considerable number of hours instead of perhaps 5 to 10 per cent for a matter of minutes. In any case, it makes no difference to the regrettable need for load shedding.

* * *

Support for the opinion that the value of secrecy is often very much over-rated in technical matters comes from Sir Edward Appleton, secretary of the Department of Scientific and Industrial Research. He related last week the experience of an aircraft company during the war that, when knowledge held by various organizations came to be pooled, each knew just about as much as the other. Willingness to publish results of investigations may often account for public credit being given to one organization rather than to another as the originator of developments upon which many concerns have been working.

* * *

The Electrical Trades Union is still pursuing its rather superfluous electricity nationalization campaign, which is what one might call flogging a horse running at top speed. The Union has produced another poster in which a "housewife" says "Switch Over the Electricity Supply Industry" and suggests that nationalization will cheapen and unify prices, promote rural development and lead to cheaper, standardized appliances. It is possible that nationalization may accomplish all this (although many think it impossible) but as the Electricity Bill is now before Parliament and it is very unlikely that it will be rejected or drastically amended, I consider that the Union is wasting time, paper and money.

* * *

Gloucester electrical contractors have resolved to hold their branch meetings at a local hostelry "where an attractive and warm room can be secured." They agree with Shenstone that—

> "Who'er has travelled life's dull round
> Where'er his stages may have been
> May sigh to think he still has found
> The warmest welcome at an inn."

—REFLECTOR.

Electronics in Industry

Scope for Wider Application

THE sole object of an official communication from the National Physical Laboratory to the Institution of Electrical Engineers, presented by DR. H. A. THOMAS in the form of a paper prepared by request at short notice, is to stimulate interest in the utilization of electronic methods and devices for aiding the more efficient performance of industrial processes. The author has therefore chosen to cover a wide field in a somewhat cursory manner rather than study in detail the great mass of scattered literature on the subject.

The purposes of existing and possible applications are classified as measurement, instrumentation and control, aids to production, means of inspection and systems of protection. General principles involved in each of the five sections are discussed, and selected examples briefly described by way of illustration.

In this way the author indicates the versatility of electronic methods; their more intensive employment, he says, will depend upon better appreciation of their utility as well as upon careful consideration of the economics of each particular function to be performed.

The number of present users is smaller than is generally supposed, but they are more numerous than many electronic engineers suspect; the potentialities are very considerable because these methods are applicable to most branches of almost all industries and, furthermore, many industries are still unaware of the capabilities of electronic systems.

The author believes that there is need for a publicity compaign to make industry aware of the potentialities. He is of the opinion that such a campaign could, with great advantage, be sponsored by a new organization devoted entirely to the exploration of possible fields of application. The paper concludes with a bibliography of sixty references to the subject.

Light and Colour

Effects in Illuminating Engineering

COLOUR in illuminating engineering was discussed by DR. W. D. WRIGHT in a paper presented to the Illuminating Engineering Society in London this week. He dealt first with the manner in which the eye discriminated between different colours and then with the way in which surface colours could be qualitatively described in terms of the six primary sensations; alternatively the quality of the surface might be described in terms of hue, lightness and saturation.

Facts about colour mixing, matching and measurement were presented with the aid of charts of the British Colour Council and the Munsell & Oswald systems employed in the United States. Finally the paper stressed the importance of the spectral composition and its constancy of illuminants.

Experiments in Decoration

Industrial decoration was the subject of an address at the Birmingham Centre of the Society by Dr. J. H. NELSON, who reversed the usual procedure by starting with results and conclusions, then afterwards explaining the reasons and processes leading up to them. With the aid of lantern slides and two projectors Dr. Nelson took the large audience on an imaginary tour through real shops which had been the subjects of experiments in decoration. The Munsell colour tree, which he explained and illustrated, figured largely in the designing of colour schemes making a fairly accurate forecast of the results possible before they were put into practice.

Colour harmonies and psychological effects were dealt with at length and it was shown how, in a boring or monotonous occupation, a stimulating colour could be an asset; in a process involving high temperatures, a cool colour could be used with psychological effect and so on.

The lecturer stressed the importance of area and saturation. Thus, a small area of say a bright red would have proportionally the same effect as a larger area of a less bright red. The conclusions were that ceilings and any pipes, etc., fastened to it should be white, preferably with an eggshell finish, so as to blend harmoniously with the lighting installation and to make the best use of the light flux. Machine tools should be decorated with light colours. The walls should be light in colour, with or without a dado as required for the purposes of contrast.

The floor should be light, but not so light as any other part of the building. Shops so treated are kept cleaner, are more popular, help seeing, reduce labour turnover and have a general atmosphere of cheerfulness.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Council of the Institution of Electrical Engineers has elected **Sir John Macfarlane Kennedy, O.B.E.**, past president, to be an honorary member of the Institution, in recognition of his distinguished work in the sphere of electricity supply and of the services rendered by him to the Institution.

Sir John was educated at Trinity College, Cambridge, and received his technical training at Zurich Polytechnic and Cambridge University. He served his pupilage with Richard Moreland & Sons, London, Willans & Robinson, Rugby, and Siemens-Halske, Berlin. From 1902 to 1934 he was a partner in the firm of Kennedy & Donkin and was engaged in electricity supply, distribution and traction works, being responsible for the first electrification of the L.C.C. Tramways, the Hammersmith and City Railway, and the Western and Eastern Sections of the Southern Railway. In 1922 he submitted to the Electricity Commissioners proposals for the reorganization of electricity supply in Great Britain and subsequently prepared a report on the subject for the Ministry of Transport. After the passing of the 1926 Act he prepared for the Electricity Commissioners the technical and financial data upon which the regional schemes were based. He was a member of the Fuel Research Board for four years from 1930, and in 1934 took office as an Electricity Commissioner, being now deputy-chairman of the Electricity Commission.

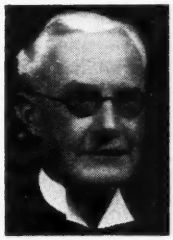
Sir John Kennedy

Sir John was elected a member of the Institution in 1914 and was a member of the Council from 1928 to 1931, a vice-president from 1931 to 1934, and in 1935 he became president. He is a past president of the Association of Supervising Electrical Engineers and a member of the Institution of Civil Engineers.

The Council of the I.E.E. has made the twenty-fifth award of the Faraday Medal to **Sir Standen Leonard Pearce, C.B.E., D.Sc.**, a past vice-president of the Institution, for his outstanding contributions to the advancement of engineering practice and notable achievements in electrical engineering.

Sir Leonard was educated at Bishop's Stortford College and Finsbury Technical College, London. He served his pupilage with J. G. Statter & Co. at West Drayton and Thomas Richardson & Sons of Hartlepool, joining the staff of the British India Steam Navigation Co. in 1894 and later becoming an assistant engineer to the Metropolitan Electricity Supply Co. Following an appointment with the British Thomson-Houston Co. he became superintendent engineer at the power station of the Central London Railway in 1900. He was appointed deputy chief electrical engineer at Manchester in 1901 and chief engineer in 1903, serving in that position until 1925 when he became an Electricity Commissioner. In the following year he left to become engineer-in-chief of the London Power Co., but again served as an Electricity Commissioner from 1940 to 1945 whilst retaining his position with the London Power Co.

Sir Leonard became an associate of the Institution in 1898, an associate member in 1901 and a member in 1904. He was for several years a member of the Committee of the Manchester Local Section of which he was chairman in 1905-6, and he served as a member of Council in 1907-8 and again from 1910-13, and was a vice-president of the Institution in 1920. He is also a past president of the Manchester Section of the Institution of Civil Engineers, the Incorporated Municipal Electrical Association, and the Junior Institution of Engineers. He is the author of a number of papers read before the Institution and other bodies.



Sir Leonard Pearce

Sir Leonard was responsible for the Barton generating station, Manchester, and for the engineering design and the operation of the Battersea station.

Mr. W. G. Hendrey and **Mr. W. H. McFadzean**, directors of British Insulated Callender's Cables, Ltd., have left this country on a visit to the company's branches in India. They are expected to be away for some months.

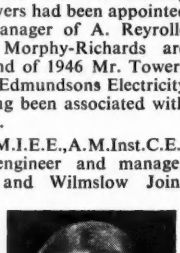
Mr. Stanley Prescott, M.P., has joined the board of the General Cable Manufacturing Co., Ltd.

Mr. F. M. Burrell, M.I.E.E., M.I.Mech.E., engineer and manager of the Jersey Electricity Co., Ltd., retired on December 31st. Educated at Paston Grammar School and Yorkshire College, Leeds, he served his apprenticeship with the Brush Electrical Engineering Co., Ltd. Before going to Jersey he carried out the electrification of Sevenoaks and District, Swanage,

Crowborough, Petersfield, and Allahabad, United Provinces, India, for Crompton & Co. Mr. Burrell has been asked to join the board of the Jersey Electricity Co. As we have already reported, **Mr. H. H. Longson,** M.I.Mech.E., A.M.I.E.E., who has been chief assistant engineer since the inception of the company, now becomes the engineer and manager.

Mr. Harry Towers has been elected a director of Morphy-Richards, Ltd. It was recently announced that Mr. Towers had been appointed director and general manager of A. Reyrolle & Co., with whom Morphy-Richards are associated. Until the end of 1946 Mr. Towers was general manager of Edmundsons Electricity Corporation, Ltd., having been associated with that company since 1933.

Mr. C. Cameron-Kirby, M.I.E.E., A.M.Inst.C.E., A.M.I.Mech.E., chief engineer and manager of the Alderley Edge and Wilmslow Joint Electricity Board, has been appointed engineer and manager of the new Margate, Broadstairs and District Electricity Board. Mr. Cameron-Kirby received his technical education at the Manchester College of Technology and subsequently held positions with the S.W. & S. Electric Power Co., at Redditch, the West Gloucestershire Power Co., the North Wales Power Co., and Salford Corporation Electricity Department, joining the Alderley Edge and Wilmslow Board in 1934. He has been a member of the North-West England Area Committee of E.D.A. and has served on the North-Western Centre Committee of the Institution of Civil Engineers.



Mr. C. Cameron-Kirby

Mr. A. H. Barker announces that on January 1st, **Mr. H. E. Baker,** M.I.E.E., A.M.I.C.E., M.Cons.E., B.A. (Oxon.), entered into partnership with him, and that their joint practice as consulting mechanical and electrical engineers will be carried on at 100, Victoria Street, London, S.W.1, under the style of A. H. Barker & Partners. (Telephone, Victoria 2688.)

The Jackson Electric Stove Co., Ltd., informs us that **Miss Ester Purvis,** for many years principal of the Cookery Advisory and Demonstration Department of the company, resigned from that position on December 31st. Many hundreds of past and present cookery demonstrators in the electricity supply industry were trained by Miss Purvis. Her activities were not, however, confined to training only. In addition to this work she organized cookery demonstrations and exhibitions (sometimes as many as twenty per week) in all parts of the country, and was responsible for the exhaustive testing to which Jackson electric cooking apparatus is subjected, and for its final passing, before being offered to the public. As a member of various committees of the B.S.I. Miss Purvis's wide experience has been of considerable service. She is the author of the "*Electrical Trading* Cookery Book." We understand that Miss Purvis is maintaining her connection with the electrical industry.

Mr. V. Watlington, M.I.E.E., was entertained at dinner at the Savoy Hotel, London, on January 16th by the vice-presidents and Council of the British Electrical and Allied Manufacturers' Association on the occasion of his retirement from the directorship of the Association. Mr. E. C. Holroyde, chairman, presided. There were also present: Mr. H. G. Allen, Sir George Bailey, Mr. R. Berry, Mr. H. W. Bosworth, Mr. D. Maxwell Buist, Mr. I. R. Cox, Mr. D. Z. de Ferranti, Mr. V. Z. de Ferranti, Sir Claude Gibb, Mr. W. W. Hughes, Sir Montague Hughman, Mr. S. C. Hurry, Mr. J. O. Knowles, Mr. G. R. Lee, Col. B. H. Leeson (Mr. Watlington's successor as director of B.E.A.M.A.), Mr. T. F. Lister, Mr. A. Glynne Lobley, Mr. W. d'A. Madden, Sir Holberry Mensforth, Mr. H. E. Midgley, Major Stanley M. Mohr, Mr. L. E. Mold, Lt. Col. R. K. Morcom, Sir George Nelson, Mr. A. G. O'Neill, Sir Harry Railing, Mr. J. S. Ramsden, the Hon. J. R. Rea, Mr. J. W. Rodger, Mr. J. M. Sinclair, Mr. L. W. Smith, Mr. H. Taylor, Mr. J. B. Tucker, Mr. D. D. Walker, Mr. G. Wansbrough, Mr. W. W. Watt, Mr. Allen West and Mr. R. S. Wright.

At a meeting of Weymouth and Melcombe Regis Town Council on December 12th, 1946, it was decided to adopt the agreement made by the National Joint Committee of Local Authorities and Chief Electrical Engineers, and to pay **Mr. T. Whitehouse,** the borough electrical engineer and manager, the appropriate full salary of £1,116, plus war bonus and car allowance, as from December 12th.

Mr. L. Rothera, chief electrical engineer of Colvilles, Ltd., Motherwell, has been appointed an executive director of the company.

Mr. H. R. Farries, B.Sc., A.M.I.E.E., chief assistant engineer at Nuneaton, has been appointed deputy borough electrical engineer to the Borough of Brentford and Chiswick.

Mr. W. Worsley, M.I.A.E., A.M.I.P.E., late of the Sterling Engineering Co., has joined the staff of A.B. Metal Products, Ltd., in the capacity of chief engineer.

Mr. S. H. Taylor has been appointed a director of the Madras Electric Tramways (1904), Ltd.

Mr. W. S. Hindle has been appointed secretary of De La Rue Plastics, Ltd.

Mr. H. Mills has been appointed manager of the Newcastle branch office of Brook Motors, Ltd., in succession to **Mr. T. Herd,** who has transferred to Birmingham. Mr. Mills is the eldest son of Mr. W. Mills, director and secretary.

Mr. E. B. Sawyer has been appointed manager of the E.L.M.A. Lighting Service Bureau as from January 1st. He had been acting manager since the death of Mr. H. Lingard.

We are glad to learn that **Mr. Jules Thorn,** chairman and managing director of Thorn Electrical Industries, Ltd., has now resumed his duties after his recent illness.

Mr. H. Bancroft, A.M.I.E.E., at present engineer in charge with the Kent Electric Power Co., Littlebrook power station, Dartford, has been appointed assistant power station superintendent to the Halifax Corporation Electricity Department, and **Mr. G. B. Heeley,** control engineer at Huddersfield, has been appointed relief charge engineer at Halifax.

The Aberdare Urban District Council has increased the salary of **Mr. W. E. Richardson,** M.I.E.E., A.M.Inst.T., general manager of the Electricity & Transport Department, with effect from January 1st, viz. £900 per annum to £1,100, with the first increment of £50 per annum as from April 1st, 1947.

Major W. D. I. Gunn, M.A., A.M.I.Mech.E., has taken up the appointment of managing director of Bristol Repetition, Ltd.

Walsall Corporation Electricity Committee recommends the appointment of **Mr. A. Robinson,** of Bolton, as technical assistant at a salary of £630 per annum.

Twenty-two members of George Cohen, Sons & Co. group of companies received long-service presentations at a recent ceremony at the Clarendon, Hammersmith. More than 125 employees have now been with the group for over twenty-five years. Those receiving presentations included **Mr. A. S. Gill** and **Mr. C. E. G.** Nye, both special directors of George Cohen, Sons & Co., Ltd. (the parent concern).

Mr. W. A. Last has been appointed as a buyer, engaged upon electronic engineering, for Henry Hughes & Sons, Ltd. During the war he was for several years with an experimental station of the War Department.

Four employees of Laurence, Scott & Electromotors have completed over fifty years' service and have been presented with long service certificates and cheques. They are Mr. G. Burrough, who has been in the erecting shop for fifty years, Mr. G. Fowler, who joined the company on the same day and has spent most of his time in the same shop, Mr. A. Moore, who has been in the winding shop for nearly fifty-one years (and has a son with thirty years' service in the Turret Department), and Mr. W. King, who has spent fifty-three years in the winding shop and is the last active survivor from the original works where the late Mr. W. H. Scott started in 1883.

Appointments Vacant.—Among the positions advertised in this issue are the following:—Engineer and manager for the Alderley Edge and Wilmslow Electricity Board; electrical engineer for the Department of Industry and Commerce, Eire; deputy borough electrical engineer for Nuneaton; generation and distribution superintendents for Gravesend; chief assistant engineer for Stockport; consumers' engineer for Ashford; and assistant secretary for the Electrical Power Engineers' Association.

The Telegraph Construction & Maintenance Co., Ltd., and Submarine Cables, Ltd., gave a dinner to some of their friends at Claridge's Hotel on January 16th. **Lord Colgrain** (chairman) presided and in welcoming the guests spoke of the very happy relations which they had enjoyed with their customers and other friends in the industry over many years. He mentioned that for him this was a jubilee party for he would shortly have completed fifty years with the T.C. & M. Company.

Sir Robert Renwick, Bt., replying on behalf of the guests, referred to the excellence of the companies' products and of the pleasant nature of his business relations with them. In a reference to the nationalization of electricity supply he said that, in common with many colleagues, his job would come to an end on account, no doubt, of the inefficient way in which the supply industry had been conducted, especially during the war years.

An excellent cabaret added to the evening's enjoyment. Among those invited were Sir Stanley Angwin, Sir Charles Bruce-Gardner, Bt., Sir Geoffrey Clarke, Sir Ernest Fisk, Mr. A. J. Gill, General Sir Hubert Gough, Sir Arnold Gridley, Sir Patrick Hannon, Professor Willis Jackson, Mr. H. L. Kirke, Mr. H. A. Lingard, Sir Thomas Purves, Lord Riverdale, Sir Alexander Roger, Dr. R. L. Smith-Rose, Sir Thomas Spencer, Sir Edward Wilshaw and Dr. H. R. Wright.

The twenty-sixth Ferranti staff dinner was held recently at the Midland Hotel, Manchester, **Mr. V. Z. de Ferranti** presiding. The toast, "The Ferranti Company," was proposed by Mr. J. Prince, manager of the Meter Department, and Mr. V. Z. de Ferranti replied. Mr. G. Knott responded to the toast "The Staff" given by Mr. D. Z. de Ferranti. The dinner was followed by dancing.

The Crompton Parkinson Manchester Social Club held its first event this season on January 10th, when about fifty members of the Manchester Branch gathered at the Bodega Restaurant for an informal meal. This was followed by a visit to the Opera House, Manchester, to see "Romany Love."

The Ekco Social and Sports Club held its third annual Christmas party on January 11th, when over 600 children were conveyed in a fleet of specially chartered coaches to and from a local theatre in Southend. Tea, a "Father Christmas" visit and gift distribution followed in the works canteen.

Some 300 members of the staff and their friends took part in a Christmas dance held by Burdette & Co., Ltd., at Clapham Baths. Mr.

Joseph Meech (chairman of the company) and Mrs. Meech, and Mr. John R. Radington-Meech (managing director) and Mrs. Radington-Meech were present. Mr. Joseph Meech welcomed the guests and the staff, and after Mr. W. R. Durtnall (installations manager) had responded, Miss Alice Nunney presented Mrs. Joseph Meech with a bouquet of carnations.

On January 16th the National Executive Committee of the Electrical Association for Women, with the Dowager Lady Swaythling, president, in the chair, gave a lunch at the Forum Club in honour of **Mr. F. S. Button,** J.P., who was recently awarded the C.B.E. in the King's Honours' List on his retirement from the Industrial Court. Mr. Button spoke in favour of the formation of an E.A.W. at the meeting held in the house of Sir Charles and Lady Parsons in 1924, and has been a great supporter of the Association ever since.

Victor H. Iddon, Ltd., held their annual staff dinner and dance at the Apollo Theatre Ballroom, Manchester, on January 8th. About 300 members of the staff and friends attended. After dinner **Mr. S. Ferguson,** managing director, made a brief speech, and Mr. D. Revington, works director, welcomed back several employees from the Forces. Mr. J. Garner thanked the directors on behalf of the staff.

Obituary

Mr. L. Christy.—We regret to record the death of Mr. Leonard Christy, managing director of Christy Bros. & Co., Ltd., which occurred on January 7th. He was at his office in the morning as usual and was walking home at lunch-time when he collapsed, and died an hour or so later. Mr. Christy had been associated with the business for more than sixty years, having joined his brother, Mr. Frank Christy, the chairman of the company, in partnership in 1885. On the formation of the company in 1906 he became a governing director and in 1933 when the company was converted into a public company, he was appointed a managing director.

Lord Southborough, whose death occurred last week at the age of eighty-six, was a director of the Westinghouse Brake and Signal Co., Ltd., from 1919 until his retirement in 1943, and had been chairman of the company since 1931.

Mr. William Albert Nimmy, A.M.I.E.E., died on January 14th at Portineaple, Dunbartonshire.

Mr. A. Bonnin.—The death has occurred at Jesmond, Newcastle-on-Tyne, of Mr. Alfred Bonnin, a director for twenty-nine years of the North-Eastern Electric Supply Co., Ltd. Mr. Bonnin was seventy-nine years old.

Mr. Hugh Ferguson, director of A. C. Cossor, Ltd., and other companies, died on January 16th in London.

Mr. P. A. W. Parkyn.—The death occurred on January 11th of Mr. Percy A. W. Parkyn, managing director of Daniel Adamson & Co., Ltd., Dukinfield.

Wills.—Mr. W. Rothwell, of Accrington, Lancs., retired electrical engineer, who died on October 4th last, left £4,465 gross, with net personalty £4,187.

Mr. L. J. S. P. Steele, late chief electrical engineer of H.M.Dockyard, Portsmouth, who died on October 2nd last, left £10,359 gross, with net personalty £5,252.

Mr. F. Viner, of the Publicity Department of the British Thomson-Houston Co., Ltd., who died on September 27th last, intestate, left £3,732 gross, with net personalty £3,616.

Sir George Hume, J.P., M.I.E.E., director of Siemens Bros. & Co., Ltd., and other companies, left £15,232 gross, with net personalty £12,427.

Municipal Reports

East Ham.—Approximately 5,000 electrical installations damaged by enemy action were repaired by the Electricity Department during 1945-46, making the total number dealt with 12,500. This information is given in the annual report of the engineer and manager (Mr. G. W. Ablitt) which also records that 100 two-year hutments erected in the borough during the year were equipped with electric lighting, water heaters, radiators and irons by the undertaking, electric cookers and wash-boilers being installed by the appropriate Government Department in 50 of them. All the 67 ten-year temporary houses erected during the year are lighted by electricity and have electric hot water and cooking facilities. Altogether the undertaking sold 36·6 million kWh, an increase of 4·2 million (nearly 14 per cent) on the previous year. Last year's sales were also 2·3 million kWh higher than in 1939-40 although there were fewer consumers—30,532 against 32,939.

Total revenue amounted to £260,335, compared with £227,228 in 1944-45. Operating costs were £221,136 (£181,301) and after payment of loan charges and tax there was a net profit of £3,563 (£2,074). The average price obtained per kWh sold was 1·543d (1·531d).

Mountain Ash.—This undertaking, which has the distinction of supplying electricity at the lowest flat rates in the country, last year made a net profit of £2,844; this was actually higher than the gross profit, there being no capital charges. In his annual report the general manager (Mr. E. W. Jones) states that sales of electricity increased by 19 per cent to 4·8 million kWh and the value of installation work carried out and domestic appliances sold during the year reached the record amount of £11,357 (compared with £6,923 in 1944-45, the previous highest figure being £4,004 in 1921). Gross revenue was £25,898 (against £18,504), the average price obtained per kWh sold being 1·28d (1·17d). The usual Christmas bonus discount was granted, bringing down the lighting flat rate on the December quarter to ½d per kWh for the first 100 kWh and 1d thereafter.

Correspondence

Letters must bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Motor Control

IN his second article on this subject "Rotor" quotes from B.S. 170 the figure of momentary overload for fractional-horse-power electric motors, but he omits the very important addendum given as Amendment No. 1 to that standard in which it is expressly stated that "the values of excess torque for motors specified in this Section are intended as a check on the ability of the machine to withstand momentary overload without injury. It is not intended that they shall govern protective devices in the control-gear or other ancillary equipment."

With regard to the sustained overloads for larger motors allowed by B.S. 168 (25 per cent for periods up to two hours, dependent on output), I do not know of any commercial control gear which can be adjusted for such delayed settings; nor do I know of any application where such sustained overload capacity is necessary. I suggest that such capacity is not required by industry and this may be one of the reasons why this ten-year-old Standard is under revision for a change-over from load with overload rating to continuous maximum rating, as was announced by the B.E.A.M.A. in the early months of last year and reported in your issue of April 26th last.

Chislehurst. A. N. D. KERR.

Electricity Bill

FOR what it is worth, I should like to point out what appears to me to be a defect in connection with the Electricity Bill.

On the whole, the Area Boards have been well-named: I feel, however, that a better name could be found than "The Yorkshire Electricity Board."

To one who has made but a slight study of the White Paper and its accompanying map, it appears that this name is misleading, since the county is apportioned between no fewer than three Areas, and York, the county's capital, is excluded from that Board's area.

A question which I should like to ask is, What are our friends North of the Border thinking of the prospect of the two southern areas of their country being responsible to the Minister of Fuel and Power, while, at the same time the North of Scotland district is responsible to the Secretary of State?

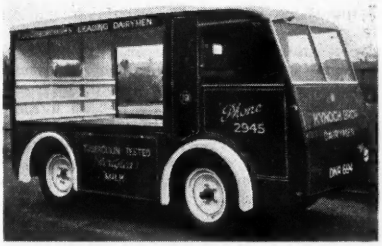
Surely these are anomalies which should and can be rectified—otherwise, where is the much-vaunted uniformity?

Crawley, Sussex. D. A. J. WELCH.

Milk Delivery Van

BATTERY vehicles are used on a large scale by Kynoch Bros., the Loughborough dairymen, who have recently acquired a one-ton van for house-to-house delivery service from Northern Coachbuilders, Ltd., Claremont Road, Newcastle-on-Tyne, 2. It is fitted with B.T.H. electrical equipment, the 12-H.P. motor being controlled on the parallel-series system by a solenoid contactor with double depression foot pedal action. Double action fuses provide short-circuit and overload protection.

The 36-cell "Exide" battery of 226 Ah capacity is accommodated in two interchangeable crates weighing 17 cwt and is charged



Standard N.C.B. one-ton milk delivery van

through a 50-A socket incorporating a safety switch that breaks the driving circuit when the four-pin plug is inserted.

The speed on a level road when laden is 18 m.p.h. with a 12 to 1 gear ratio and the range of travel without stops when half loaded is up to 45 miles per charge. The gradient capacity with a full load is 25 per cent for one minute, or 10 per cent for ten minutes.

The vehicle is 12 ft 2·5 in. long by 6 ft 11 in. high and 5 ft 8 in. wide overall. Its chassis weighs 13 cwt, having an all-welded channel section frame. The drive is through a flexibly coupled propeller shaft and double reduction gearing to the rear axle; the steering is of the cam and roller type. The brakes are of the Lockheed hydraulic and Girling hand-actuated "umbrella" types; Timken bearings are fitted to the wheel hubs and the semi-elliptic springs have "Silentbloc" rubber bushes.

The body, which weighs 6 cwt, is jig-built to permit easy replacement of standardized parts, half or full length doors with sliding glass windows being optional extras.

Conjoint Conference

Public Utilities and Nationalization

SPEAKING at the annual meeting of the Conjoint Conference of Public Utility Associations on January 22nd, Viscount Falmouth, the president, said that in the year under review there had been difficulties for industry which, although to a certain extent was natural in the period following the war, had been accentuated by the Government's policy of nationalization. The coal industry, upon which gas and electricity depended, had already been nationalized. The Conference, representing the consumers of no less than 25 per cent of the total mined coal produced, or 40 per cent of industrial coal, could not be indifferent to the state of the coal industry and now that the National Coal Board was in the saddle the Conference wished it well.

Transport and Electricity

Many considered that, before introducing legislation for the nationalization of other industries, it would have been in the national interest to allow sufficient time to elapse to demonstrate whether the claims made for national ownership were justified in practice. The Government, however, decided to introduce at the beginning of the new session a Bill to nationalize the transport of the country, and this had already been read a second time in the House of Commons. A similar Bill applicable to the electricity industry had also been introduced and awaited second reading. The Transport Bill had been vigorously opposed by the transport interests; and electricity supply and power companies were of the opinion that the transfer of their industry to national ownership was not in the general interests of the electricity consumers of the country.

Since the measures for effecting the nationalization of the transport and electricity industries had not become law it was impossible to discuss them without entering the arena of politics. It was outside the province of the Conjoint Conference to take any part in political controversy and the attitude to be adopted to the principle of nationalization was a matter to be decided by the national organizations of the industries affected.

There was no doubt that the main interest of many of the Association members of the Conjoint Conference would, during the present year, be directed to the future organization of their own industries and they would have little time to consider measures by which they were less directly affected. For this reason it appeared to be more important than ever that until nationalization was effected the Conference should continue, in all matters in which joint action could be taken, to act as watchman for the public utilities of the country.

It was satisfactory to be able to report that the Joint Negotiating Committee on Mains and Cables in Highways, consisting of representatives of the highway associations and of the Conjoint Conference, had come to a final agreement. The Conference came into being primarily to defend the common interests of public utility undertakings as users of the highways, and the settlement of a code of provisions, as embodied in the negotiated clause, could be regarded as one of its most important achievements. The importance of obtaining a right relationship between highway authorities and public utilities which were empowered to break open public highways was fully appreciated by the Minister of Transport, who had expressed his willingness to introduce public legislation on the subject as soon as Parliamentary time would allow.

Referring to the subject of war damage, Viscount Falmouth said that more than a year after the end of hostilities and five years after the publication of the Government's White Paper on the subject, public utilities still did not know the precise nature of the damage which would be covered by the proposed Public Utilities War Damage Scheme and the extent of their liability in respect of contributions. This matter should be settled without delay, but he feared it was doomed to a low "priority" among measures awaiting Parliamentary attention.

Future of the Organization

Referring to the future of the Conference, Viscount Falmouth said that no one could tell what the New Year would bring forth; it might be that during the year the electricity industry would pass into national ownership and it was impossible to forecast the future of electricity associations who were members of the Conjoint Conference. Next year the same doubt might arise with regard to the gas association members of the Conference. The future of the Conjoint Conference was, therefore, uncertain. There would, however, still be many questions upon which the advantages of combined action would be apparent. Many problems would arise in connection with income tax and rating assessments, where it might be necessary, in the immediate future, to defend the accepted principle that public utilities were to be assessed upon the basis of their receipts and profits.

He felt it was unlikely that the Conference in its present form could survive the nationalization of the gas, electricity and transport industries. Those industries, however, would be faced with a variety of problems regarding which their interests were identical and there were good grounds for the view that some machinery might be devised through which the benefits of united action might be secured.

Electricity Nationalization

Views on the Bill: Companies' Objections

COMMENTS upon the Electricity Bill are naturally coloured by the commentators' political convictions, but apart from the political aspect newspapers in all parts of the country have expressed views which deal realistically with certain points.

Generally the Scottish press welcomes the separation of the North of Scotland from the main scheme but the *Daily Record & Mail* (Glasgow) agrees with Mr. Tom Johnston, chairman of the North of Scotland Hydro-Electric Board, that it is unnecessary to split the rest of Scotland between two area boards. He would have preferred to have "a consultative group of local district councils with which local authorities operating their own undertakings competently might have been co-ordinated."

The *Scotsman* says:—

"In Scotland not only are municipal undertakings efficient and relatively of much greater importance than in England, but consistent efforts have been made over a number of years to pay off borrowed capital. This could not be done without a corresponding charge on users. The burden thus borne will convey no advantage, and since the Government are to take over liabilities Scottish local authorities will have good reasons for wishing that they had not displayed such financial probity but, like others, had been less zealous in reducing outstanding debts."

The East Anglian area, which embraces, in addition to Norfolk and Suffolk, Cambridgeshire, Hertfordshire, Huntingdonshire, and parts of Bedfordshire, Buckinghamshire, Essex, Middlesex, and Oxfordshire, is by far the largest of the fourteen areas, although it is fourth in order of population. It is considered by the *East Anglian Daily Times* that "doubts may well be entertained as to whether the area is not too large for efficient administration."

In common with many other newspapers the *Yorkshire Post* attacks the basis adopted for the acquisition of municipal undertakings which it contends will "penalize precisely those local authorities whose electricity undertakings have been efficiently run and whose policy it has been to reduce capital debt charges out of profits instead of utilizing these for the relief of the rates," Leeds, which has repaid about £7 million out of £12 million capital expenditure, and York, which has redeemed about two-thirds of its debt, are cited as examples, although the *Yorkshire Evening Press* points out that the York undertaking in the last three years has contributed a sum equal to 5d. in the pound to the relief of rates.

This other aspect of the contribution-to-rates question is touched upon by the *Western Mail* when it says that at Swansea the benefit of any reduction in costs has been passed on to the consumers with the result that Swansea prices are considerably lower than the national average. "The municipalities which are going to be the worst hit are those which unlike Swansea have been making large annual contributions to the relief of rates, for such contributions will now end."

Mr. F. W. Godden, the Coventry city electrical engineer, is quoted by the *Coventry Evening Telegraph* as saying that the local undertaking had been subsidizing the Corporation's annual income to the extent of £20,000, which was equivalent to an addition of 3d. in the pound to the rates.

The *Liverpool Daily Post* says that the city electricity undertaking's contribution to the rates last year was some £50,000; the pre-war average was £70,000. "A question for Liverpool is whether the general benefits are worth the sacrifice." The same paper considers that the Merseyside and North Wales Area, of which Liverpool is the centre, "seems a well-composed area."

Mr. R. A. S. Thwaites, chief engineer and manager of the Manchester Corporation Electricity Department, is quoted by the *Manchester Guardian* as stating that the undertaking's capital expenditure had amounted to over £16 millions, but in considering that figure, it should be remembered that some of the plant was old and some new. The outstanding loan debt stood at just over £6 million.

Companies' Statement

A MEETING of representatives of the companies' side of the electricity supply industry in London unanimously resolved to oppose the Bill as being contrary to the public interest. A statement issued by the Public Relations Committee of the companies warns the public that the Bill puts politics first and that it has been framed primarily to bring an efficient and progressive industry under political management. There is no assurance that nationalization will produce better or even as good results as have been achieved in the past or are aimed at in the future by the industry as at present constituted.

The Bill seeks a monopolistic control of the industry, without any protection or advantages to the public. The Board to be set up can in fact dictate its own charges. The Consultative Councils, on which consumers will be in a minority, will have no real powers. There will be no appeal to an independent judicial body as there is now. The code whereby electricity

employees can claim compensation for loss of employment or alteration of status now in the Electricity Acts, is swept away. Under the Bill, the whole of this problem is left to the Minister of Fuel and Power who is to make fresh regulations on these matters. These regulations cannot be amended by Parliament which can only pass or annul them.

The Bill provides for an extreme measure of centralization in place of the present decentralized system which has always proved both flexible and efficient. The Electricity Areas suggested in the Bill are too few and too large, and the single Board at the head of the organization means perpetual reference back to "higher authority."

While the Area Boards are setting up their organizations, which must mean further additions to the ranks of bureaucracy, all the plans prepared by the companies for development will be halted, and no other plans can immediately take their place. Speed is the most vital factor in our national recovery. The Bill means an initial delay of one to two years and a subsequent slowing down of the pace at which new supplies are provided. It will not put forward by one day the time when electricity cuts will cease—in fact inevitably the reverse. In spite of the many statements regarding the need for nationalizing the industry so as to make supplies available in the countryside, there is not a word in the new Bill putting any obligation on the new Boards to develop rural supplies.

The compensation clauses of the Bill, by which companies are bought out on Stock Exchange values, are described as "spoliation." Furthermore, the representatives of the companies, speaking as ratepayers, feel that the Bill gives the municipalities just as bad a deal as to themselves. Following the announcement by the Chancellor of the Exchequer that he hoped high dividends would not be paid, the majority of the companies loyally abided by this request. Further, it has been the almost universal practice in the industry to plough back a considerable proportion of earnings into their businesses. These factors, together with the threat of nationalization, have very adversely affected the share prices at which it is proposed that they should be taken over, and the Government's proposals must be regarded as a direct discouragement to thrift in industry, and, in fact, to the national policy of saving.

Those companies, which operated in London and the South of England throughout the war with great credit to themselves as a public service, find their share values depressed as a result of their wartime experiences and damage suffered. To be bought out on these depressed share values is a grave injustice. It is emphasized that the compensation proposed for the stockholders represents far less than the present value of the assets, and the income of many thousand people, the vast proportion of whom own less than £500 of stock, will be cut by more than one-third.

F.B.I. Objections

THE Federation of British Industries, as representing a very large body of consumers of gas and electricity, can see no evidence to suggest that the nationalization of these services will bring any advantage to industrial consumers. Moreover, it is apprehensive that increases in cost and lower standards of service to the industrial consumer will result from the establishment of vast administrative units of the pattern now becoming apparent. Evidence shows that the two industries, both privately and publicly owned, as at present constituted, are both able and willing to carry through any reorganization that is required.

A representative committee of consumers has reviewed the question from the point of view of quality of supply, cost, and standard of availability and service offered. It has come to the conclusion that judged by the criteria just indicated, past services, with few exceptions, have been satisfactory, and both industries have maintained continuous progress over a long period. Both industries have adequate proposals—by way of amalgamation and grouping—to overcome limitations to further progress due to existing structure and legislation. Furthermore, both industries are alive to the need for extensive technical developments, and have both the plans and the funds ready for this purpose. For these reasons the Federation reiterates its strong objection to the Government's proposals.

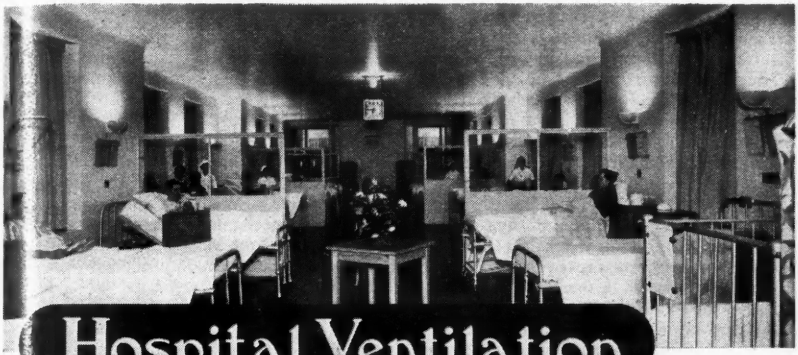
Compensation Basis Criticized

IN the opinion of Mr. C. Heathcock, chairman, West Midlands Joint Electricity Authority, and managing director of the Midland Electric Corporation for Power Distribution, Ltd., the most objectionable features of the Bill are those relating to the terms of acquisition.

Mr. Heathcock, in a statement made last week, said that reasonable compensation for an undertaking, which every owner had a right to expect, consisted of the value of existing physical assets at replacement cost but subject to consideration of age and condition, and the value of the owners' legitimate expectations of the profits accruing in the minimum period for which the undertaking would have remained in their possession but for nationalization. Those without a fixed date for purchase might be taken at a period of fifty years. The details of a settlement on that basis could probably be negotiated with all the interests concerned without the feeling of confiscation engendered by the proposals in the Bill.

I.M.E.A. Meeting

The Council of the Incorporated Municipal Electrical Association considered a report on the Bill by its Parliamentary Committee at a meeting last week and decided to call an extraordinary general meeting of members for February 20th.



Hospital Ventilation

By G. H. Priestley,
A.M.I.H.V.E.
(Woods of Colchester, Ltd.)

THE problems associated with the ventilation of hospitals not only differ from those of other public buildings but vary appreciably according to the requirements of the particular sections or departments, e.g., wards, operating theatre suites, kitchens, laundries and other rooms.

Few hospitals have mechanically ventilated wards, the usual practice being to rely on natural ventilation, i.e., cross-ventilation by open windows. The main drawback of this system, though, is that it depends on different internal and external temperatures, and although it may work well enough during the winter months when external temperatures are low, it is not satisfactory in the summer when the temperatures are practically equal.

Ventilation can be provided for the wards by various means, e.g., by a central plant having filters, washers, heaters and centrifugal fans, and distribution by a trunking system (a plenum system) or, alternatively, by an extract system using silent-running propeller fans mounted in the walls, in which fresh-air inlets are built behind the radiators of a central-heating system. Incoming air should pass through filters easily accessible for inspection and removal for cleaning. For single-storey wards, roof-mounted mechanical extract units with fresh-air inlets in the side walls are recommended.

Babies' wards require special attention. Room temperature and relative humidity must be kept constant. An air-conditioning plant capable of supplying approximately eight air changes per hour is essential. Its input side should have highly efficient air filters, a washer and humidifier as well as the heater banks. The fan is usually a centrifugal type arranged to discharge into trunking which distributes the conditioned air through grilles into the ward. The extract system usually removes approximately 75 per cent of the input volume, thus maintaining a pressure to prevent the flow of unfiltered air into the ward when doors are opened. This extraction can be by means of wall-mounted propeller fans, mechanical roof units or trunking and centrifugal fans, depending on the type and construction of the building.

The ventilation of modern operating theatres is artificial, the system usually comprising a simple mechanical inlet providing warm, filtered air by means of ducts and carefully chosen extract points equipped with quiet-running propeller fans.

The ventilating plant is usually housed in a specially constructed chamber, often above or below the theatre, and consists of a dust filter, pre-heater, washer and humidifier, main heater, centrifugal fan and motor. The fan and motor should be mounted on a thick anti-vibration base as a means of ensuring freedom from noise.

The plant is generally designed to give approximately ten air changes per hour in the theatre and to maintain automatically the required relative humidity. Operating theatres are usually constructed with the anæsthetizing and sterilizing rooms adjoining the actual theatre, doors being omitted where possible to allow free movement and observation.

This omission of doors assists in the general ventilation of the theatre suite if the plant is designed to build up the air pressure in the theatre so that the natural movement of air is outwards, thus preventing the flow of steam and ether fumes into the operating theatre. To assist further in the maintenance of this air flow the extract fans should be installed in the anæsthetizing room and over the sterilizing equipment.

A necessary feature in sterilizing rooms is some form of hood to contain and trap the clouds of steam that rise when bowl and instrument sterilizers are open. This hood can be constructed either from timber or sheet metal but should be designed to hold the steam until the extract fan can clear it. The hood should have a small half-round channel, usually made by splitting a ¾ in. diameter pipe fixed to the bottom edge to conduct away condensation which would otherwise drip on the heads of the staff.

Kitchen and Laundry

In kitchens the object is to remove cooking odours and to keep the room temperature low enough to permit the staff to carry out its duties in comfort. The number of air changes per hour required will depend on a number of factors, but will usually be between twenty and forty.

Some kitchens can be adequately ventilated by fitting a large propeller fan in one wall and fresh-air inlets in the opposite wall, thus giving cross ventilation, or by fitting roof-mounted extract units fitted with propeller fans to assist the natural upward flow of the higher temperature air. More often, however, hoods are fitted over the cooking apparatus, thus confining the polluted air within a relatively small area. The hoods are usually connected by ducts to an external wall and a propeller fan is installed in a fan chamber. If a number of hoods or long lengths of trunking are connected to one main duct, thus creating too high a resistance to air flow to permit the efficient use of an ordinary propeller fan, the axial-flow fan with blades designed on the aerofoil theory is very satisfactory.

Laundry ventilation to a large extent follows the principle of kitchen ventilation, i.e., machines, equipment and processes emitting heat or steam are hooded to localize the heat which is then discharged to atmosphere through ducts by means of either a propeller or an aerofoil fan.

Some hospital laboratories require complete air-conditioning systems with automatic temperature and humidity control. In most there are fume cupboards for carrying out experiments which give off objectionable or poisonous fumes. These cupboards are often ventilated by a separate mechanical extract system, usually by carrying a duct from the top of the cupboard to an external wall and fitting into it either a centrifugal fan or an extended spindle fan. The motor should be kept out of the air stream as the fumes may be corrosive. W.C.s in hospitals should always be mechanically ventilated. Extract ventilation is the only recommended form and is adequately accomplished by means of a window fan.

Boiler-house ventilation can take many forms, depending on the position and construction of the boilers and housing. As a general guide, mechanical ventilation should take the form of fresh-air input. By this means an ample supply of air for combustion is available and any excess air, together with heat from fittings, boilers, etc., finds its way to the atmosphere through a louvred jack-roof.

The ward shown in the title illustration is in Redhill Hospital, Edgware.

Diesel Plant in Paper Works

MAKERS of high-grade writing, printing and art papers for over 100 years, the Carrongrove Paper Co., Ltd., Denny, Stirlingshire, has recently installed a Diesel-driven alternator set in place of the steam set which has been in use for more than thirty-five years. The function of this set is to supply power for the power station and steam boiler house auxiliaries when starting up the turbo-alternators and for running motors for maintenance work when the turbo-alternators are shut down. The set was supplied by Associated British Oil Engines, Ltd., and comprises an S.S.3 series V Mark I three-cylinder two-stroke cycle Petter "Super-scavenge" oil engine, developing 225 B.H.P. at 500 r.p.m., direct-coupled to a Brush alternator having an output of 150 kW at 400/440 V, three-phase, 50 cycles supply at 0·8 p.f. The alternator is of the salient-pole, revolving field, single pedestal bearing type, and both engine and alternator are mounted on a combined fabricated steel base-plate. The engine flywheel to which the alternator is direct-coupled limits the cyclic irregularity to 1/152. Starting is by compressed air, which is supplied from an air receiver with a capacity of 5 cu ft, charged by an air-cooled air compressor V-belt driven by a 2-B.H.P. Petter air-cooled petrol engine. To control this set and to synchronize it with the turbo-alternator of the existing equipment there is a Brush switchboard on which is included a carbon pile type automatic voltage regulator.

Bankside Power Station

Inquiry into City Company's Proposals

PLANS prepared by the City of London Electric Lighting Co., Ltd., for the rebuilding and extension of its Bankside station, Southwark, at a cost of £11 million, were the subject of a joint inquiry by the Ministry of Town and Country Planning and the Electricity Commissioners at Southwark Town Hall last week. The proposals were opposed by the London County Council, the City of London Corporation, Southwark Borough Council and local organizations.

Sir Cyril Hurcomb, chairman of the Electricity Commission, presided, and with him were Mr. K. S. Dodd, representing the Ministry of Town and Country Planning, Sir John Kennedy, deputy-chairman of the Commission and Mr. H. Nimmo, Electricity Commissioner. Sir David Maxwell Fyfe led for the company and Mr. J. Scott Henderson, K.C., represented Southwark Borough Council.

The main argument was whether the company should re-build on the present site according to designs by Sir Giles Gilbert Scott, designer of Battersea Power station, or on an alternative site at Surrey Docks, Rotherhithe, which the L.C.C. offered. The argument was governed by the conditions of the County of London Plan on which evidence was given by the joint author, Sir Patrick Abercrombie.

Sir David Maxwell Fyfe maintained that the proposed new building, which Southwark Council said was incompatible with the development of the area under the County of London Plan, could, in fact, harmonize with an area developed with flats, offices, parks and open spaces. He said that industry was not necessarily associated with squalor.

Architect's Opinion

Sir Giles Gilbert Scott said that a power station surrounded by gardens could provide a magnificent view on the south side of the Thames. There was at Bankside a fine opportunity for a "neighbourhood unit," with houses, flats, offices and gardens grouped round a power station which would provide employment for the area. He envisaged the London of the future with a skyline of a limited number of big buildings suitably separated by a number of low level buildings.

Sir Leonard Pearce, engineer-in-chief of the London Power Co., called as a technical expert, said that the coal for the station would be taken under cover, without dust or noise, and the latest processes of guarding against dangerous fumes, water pollution and other harmful effects would be used, following experience at Battersea.

Mr. John Thompson, for the City of London Corporation, suggested that the power station would conflict with the re-planning intentions of the Corporation, which had reckoned on an open vista in front of St. Paul's Cathedral.

Mr. H. J. Randall, managing director of the company, said the present station was far from modern in design and construction. In 1939 the company was asked by the Central Electricity Board to re-construct it. The war stopped this project. A fresh request was received from the Board in 1944. It was the company's intention to re-build it as a modern station to increase its "export" of electricity to other districts from 30 per cent at present to about 50 per cent. The City of London was the main consumer of the company's electricity, with Southwark a good second and a bulk supply was also produced for Southwark Council.

Mr. J. Hacking, chief engineer of the Central Electricity Board, agreed that an alternative site at Rotherhithe might be capable of accommodating a larger generating station than was contemplated at Bankside, but it would lead to an increase in the cost of electricity to the consumers.

Borough Engineer's Objections

Mr. J. E. Hardy, Southwark borough engineer, told Mr. Scott Henderson that he contemplated plans for a cultural and residential area at Bankside with all industry excluded except light industry in certain parts. He anticipated offices moving from the City and had already received inquiries from a large potential occupier, King's College, London, which wanted ten or twelve acres. He regarded this as ideal development of the area. A power station would convert the use of the area from commerce to industry.

Mr. Scott Henderson said he challenged the claims of the promoters of the scheme. Large industry in the neighbourhood would turn away commercial development which was necessary if this area was to be developed properly. People might be out of date but nevertheless there was a psychological objection by many to setting up offices near a building such as a power station, however modern and beautiful it might be. Although the promoters might have made out a strong case for a new station somewhere they had not made a sufficiently strong case for one at Bankside.

Sir Patrick Abercrombie, joint author of the County of London Plan, opposed the building scheme. He considered that the power station would be totally at variance with revised plans for the area and entirely change the character they had contemplated for the area. It would have a damaging effect on the attraction of good class institutions and offices. The power station could well be built at Rotherhithe. His original plan for London had included hopes that the

generating plant would go well outside the Greater London area. Some years ago he had proposed that all London's power should be generated on the Kent coalfields.

Mr. C. H. Walker, director of housing and valuer for the L.C.C., said he had received many inquiries for sites for hotels, institutions, flats, business offices and colleges, including King's College, London, on the South Bank. He believed the power station scheme would form a barrier to the better development of that side of the river.

Sir David Maxwell Fyfe, in his final statement, said that the Abercrombie Plan for South London was not elastic and therefore could not be treated as a complete plan. It excluded means of providing for generating stations. There was no planning for them and only a short passage in the Plan in which power stations were mentioned. Sir Patrick Abercrombie had suggested that the power stations should be on the lower reaches of the Thames or on the Kent coalfields. Sir David quoted production figures to show that the coal output there was immeasurably less than would be required for the production of all London's electricity.

The L.C.C., in opposing the scheme of the company, was, in effect, warning them off the river above London Bridge. Further up the river were Battersea and Fulham power stations and beyond them there would be difficulties about water. They were left with the consideration of this site and the alternative site proposed at Rotherhithe. Sir David maintained that a public utility company had certain rights conferred by Parliament and should be given special consideration.

He replied to the statements on the æsthetic problems involved in the development of the area. On the Rotherhithe alternative, Sir David said the evidence given for the L.C.C. was extraordinarily vague in some respects and remarkably optimistic in estimating when the site would be available for building a new power station.

He reiterated the precautions that would be taken to prevent nuisances through the working of a power station and said if it were desired the company would consider the possibility of providing a district heating service for the area.

The inquiry was concluded on January 17th after a four and a half days' hearing.

Gas-Turbo-Electric Locomotive

Metrovick Equipment for Great Western Railway

FOR express passenger service on the main lines of the Great Western Railway, radiating from Paddington, the Metropolitan-Vickers Electrical Co., Ltd., is building a 2,500-H.P. gas-turbine locomotive to the requirements of Mr. F. W. Hawksworth, chief mechanical engineer of the railway company. The trains sometimes consist of eighteen coaches weighing 650 tons and will run at speeds up to 90 m.p.h. There are sustained gradients of 1 in 80 and short gradients of 1 in 40. A starting tractive effort of 60,000 lb and an adhesive weight of 120 tons, together with continuous tractive efforts up to 23,000 lb, corresponding to 35 m.p.h. are required. The locomotive has two three-axle bogies, each driven by a geared motor, and a driving cab at both ends. Between the cabs are the power unit, electric transmission equipment and auxiliary machinery.

The gas turbine is of the open-cycle type in which compression heating, expansion and cooling proceed simultaneously and continuously. Compression takes place in a multi-stage axial-flow 6,900-r.p.m. compressor developed by Metropolitan-Vickers in conjunction with the Ministry of Aircraft Production for aircraft engines, as distinct from the centrifugal compressor used in the Whittle engines.

After compression in a 3½ to 1 ratio, the air thus heated passes through a heat exchanger, where it is further heated by the turbine exhaust, to the combustion chambers. Here fuel oil, issuing from high-pressure nozzles, burns in primary chambers, which are traversed by a small proportion of the total compressed air, and the hot gases rejoin and mix with the remainder of the air to raise its temperature to its final value. Thereafter the gas flows in sequence through two axial-flow turbines on separate shafts. One of these is a single-stage wheel driving the compressor and the fuel and lubricant pumps; the other is a multi-stage design which drives the main generator and the 110-V d.c. auxiliary generator through reduction gearing having a ratio of 4,500 to 850 r.p.m.

By the adoption of two mechanically independent turbines increases in electrical load can be met simply by increasing fuel input; this speeds up the compressor and automatically results in correct fuel-to-air ratio and operating temperatures.

The turbine input is over 2,600 H.P., the difference between which and 2,500 H.P. covers gear losses and auxiliary generator input. The interchange of power between the compressor and its turbine is about 4,500 H.P. at full load. Approximately 44,000 cu ft (1½ tons) of filtered air per min is required. The full generator input can be utilized over a range of 10 to 75 m.p.h. by adjusting machine excitation.

Electrically driven auxiliaries comprise air-brake compressor, vacuum-brake exhauster, traction-motor ventilation and gear-oil cooler fan. The turbine is started by an electric motor fed from a battery which is kept charged automatically from the auxiliary generator. Steam heating is provided by an oil-fired boiler.

Credit Risk Protection

Insurance Against Customers' Defaults

By Gordon Lowe

ALTHOUGH to some extent a "sellers' market" still obtains and will persist for months to come, there is in industry a growing tendency to ask for credit facilities where cash with the order was usual a twelve-month ago. From one point of view this move is a fairly good one as it indicates that business is attempting to regain its natural level. On the other hand it may well indicate that trading resources are becoming fully employed; that stocks are not being liquidated so rapidly as they were.

During the wartime production stampede failures in any trade were few, but during the last three months the insolvency graph has been steadily climbing and the commercial world has been rudely shaken by the public announcement of financial difficulties by at least one manufacturing organization generally believed to be soundly capitalized. These are pointers which business men will not be slow to appreciate.

Changed Conditions

The necessity for the fulfilment of wartime contracts regularly outweighed the importance of conservatism in credit granting. Small businesses sprang up overnight, obtained Government contracts and made headway. To all intents and purposes, credit was on an unrationed basis. But now these small businesses are beginning to feel the pinch. They have not the facilities to convert their small factories for the production of consumer goods and, if they have the ability and the facilities, it is very doubtful whether they have the finance. In consequence, the credit which they expect (based on their wartime experience) must be curtailed and in many cases eliminated. This will serve to separate the wheat from the chaff.

Business managements have, for some time, been endeavouring to reintroduce the pre-war credit control into their organizations. Subscriptions have been renewed to inquiry bureaux, closer investigation is made of current trading experiences, and travellers are instructed to support their inquiries and orders with reliable data and references. But, with all the care in the world, confidence will continue to be misplaced as it was before the war. Important and lesser-known firms will be forced to meet their creditors and, whether the failure is a "good" or a "bad" one, and whether the amount individually at stake is large or small, credit losses have to be made good out of profits earned and it may take sales of several times the value of the debt merely to recoup them.

There is, ready to hand, an inexpensive means of offsetting the major proportion of these disquieting losses. Credit insurance is the cover given to manufacturers and merchants against loss of the invoice value of goods due to the insolvency or the "protracted default" of their customers. In addition, it is possible to embrace within the policy any costs, charges and expenses incurred in the disposal of goods manufactured to the special requirements of a customer but of which he cannot take delivery owing to his failure.

Failure to pay for goods delivered on account of a dispute as to quality, etc., cannot be insured against. Where straightforward insolvency occurs it is necessary that the insured debt shall be admitted to rank against the insolvent estate and where "protracted default" occurs the insurer will require satisfactory proof that the goods were delivered in accordance with the terms arranged and that the customer is really in default.

Home and Export Transactions

Credit insurance is not underwritten by the general insurance companies. Their interest in this market is evidenced by the reinsurance share which they take in policies issued by the existing company market. Whilst private enterprise underwrites risks both on home transactions and for the export market, the Export Credit Guarantee Department of the Board of Trade confines its activities solely to the risks which attach to goods exported.

Broadly speaking, credit insurance is divided into two sections. The first provides policies which cover one or more named customers up to stated and agreed credit limits. A policy may be taken out for one transaction or for a series lasting the policy period, which is normally twelve months. One basic form of policy is available for all

branches of individual cover, the various adaptations being achieved by the addition of clauses and riders.

As regards the proportion of cover which is available: normal business transactions may enjoy protection up to 90 per cent, which means that the seller runs the risk himself of only 10 per cent of the invoice value—a proportion which may well mean that the ultimate loss to the seller is nil. Where the type of business is speculative the proportion of cover will be reduced down to as low as 50 per cent but this applies only to trades where the profit ratio is high and the hazard in proportion; it is not likely to be applicable to the electrical trade.

While, for premium purposes, some individual policies are based on the turnover realized and notified, others are based on the gross amount of credit likely to be outstanding at any one time and it is on this stated figure that the premium rate is calculated.

Adjustment of Premium

Comprehensive insurance policies are available for home transactions and for export credits either with all markets or with a selected number of importing countries and are applicable to the whole turnover realized with them. At the inception of a policy a deposit premium is payable and this is adjusted on expiry in accordance with the rates agreed for the various countries and on the turnovers realized with each.

Every assured trader has a discretionary limit within which he is his own judge of the facilities he extends. Larger credits necessitate the written agreement of the insurance company. All goods sold and delivered during the twelve-month period of the policy remain covered under that policy irrespective of the length of time taken for payment.

At inception of the policy, also, arrangements may be made for the inclusion of the possibility of loss on the re-sale of goods which have been especially ordered and which cannot be delivered owing to the insolvency of the buyer.

The real object of the whole turnover policy is to indemnify the seller against catastrophic loss. In normal times there are normal credit losses but there are also the extraordinary losses which are so frequently accompanied by disaster to one or more of the less strongly capitalized creditors. Whatever the type of policy to which subscription is made, the possibility of continued damage to the seller through being involved in losses is nullified by the method of prompt settlement which is in force. Once insolvency has taken place (bankruptcy or a composition, etc., by an individual, liquidation or the appointment of a receiver for the debenture holders in the case of a limited company) payment of the indemnity will take place within one month from the debt being admitted to rank against the estate.

Of course, although the cover is a protection against the net loss, it is not possible for that to have been ascertained within such a short period and settlement of the matter on a total loss basis is accompanied by the transfer to the company of an equivalent proportion of the gross amount owing and attachable.

Cover for Exporters

Notwithstanding the basing of business on the permit system both for export and import, there are other causes which may bring about losses (or potential losses) than the straightforward financial difficulties of an insured customer abroad. In some foreign countries the laws applicable to bankruptcy and insolvency are more "generous" than those which prevail here, but provided an "equivalent to insolvency" has taken place, the policy stands behind the exporter. Exchange restrictions may bring about losses: these are coverable. War, riots, civil commotions and similar happenings may all bring about insolvency of importers and such causes are not excluded from the motives which may bring about a loss. The sole criterion is whether insolvency has taken place or whether a state of protracted default has been brought about.

Indirect Advantage

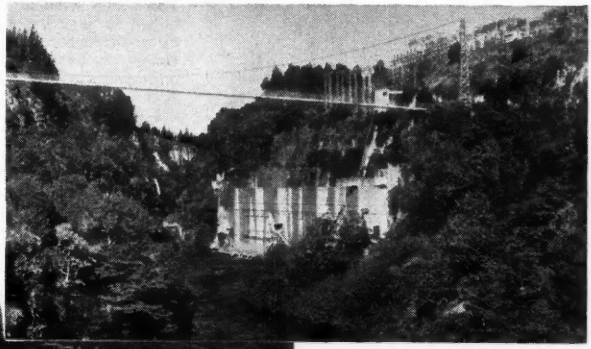
Quite apart from the protection value which a credit insurance policy will bring to any manufacturer or merchant, its value as a means of obtaining better consideration from finance houses is considerable. Banks which are aware that their customers have the foresight to subscribe to a cover which affords them full protection are far more generous when it comes to a request for some financial consideration.

It can be said in conclusion that this branch of insurance has kept in step with the movement of the times and policies are available for all types of wholesale transfer of goods. Closer details are obtainable from an insurance broker.

New Zealand Progress

Seven-Year Extension Plan

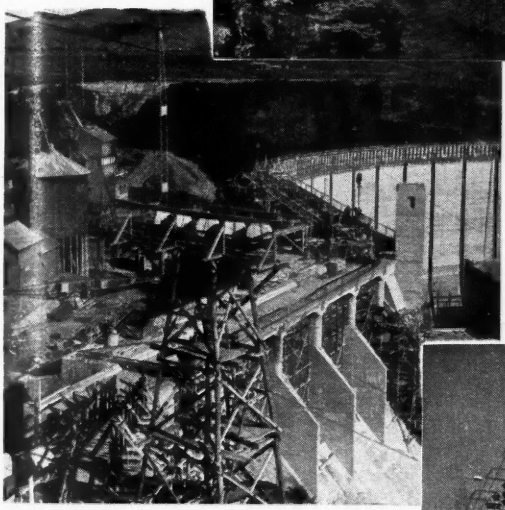
ALREADY the world's largest consumer of electric power on a per capita basis (consumption 3,805 kWh per head annually), New Zealand has started work on a plan to double power production in the next seven years. Hydro-electric power is controlled by the State which has now £29,000,000 invested in various projects. It is claimed that electric power is available to 96 per cent of the population.

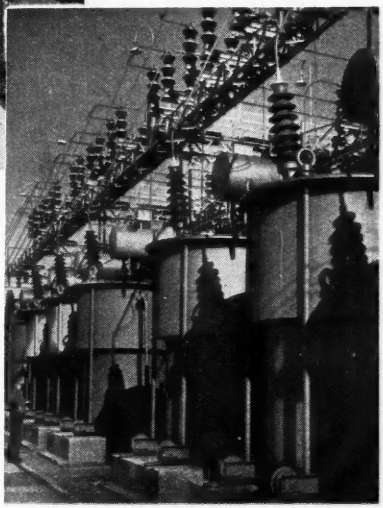


Hydro-electric power station at Arapuni, North Island

The Aratiata Rapids in the upper reaches of the Waikato are to be harnessed to produce 60,000 kW and at the Huka Falls there is to be a hydro-electric station producing 40,000 kW.

The work on the erection of a transmission line network in the rural areas has so far

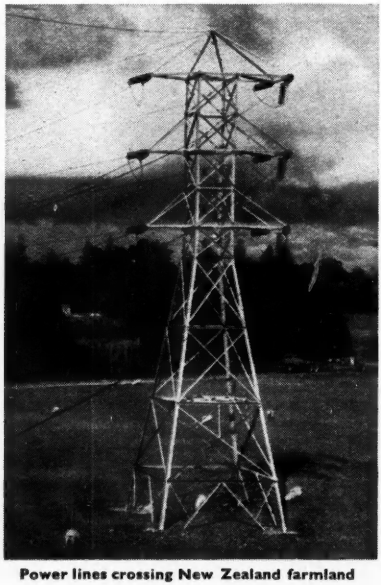




Above : Karapiro station which will go into operation during 1947, and (right) 110-kV outdoor transformer station at Arapuni

The existing Arapuni station on the Waikato River, whose waters are to be used ten times over to produce a million horsepower, is to have its capacity increased. Construction work is well advanced on the 200-ft high dam at Karapiro, also on the Waikato River, and this station will be in operation during 1947.

advanced that power is now available to 93 per cent of New Zealand's farmers. Many more substations are being built to cope with the increased distribution demand.



Power lines crossing New Zealand farmland

Electrical equipment is imported from overseas, chiefly from Great Britain. Delays in arrival of equipment have held up expansion and in 1946 power had to be rationed during the winter. To accommodate workers who will be engaged in building the power projects, and later in maintaining them, the State is building modern villages with full urban facilities.

The New Zealand Government has issued detailed statistics regarding electricity generation and supply for the year ended March 31st, 1946. The total kWh generated reached a fresh record—2,364·9 million kWh or over 91 million kWh more than in 1944-45. Retail sales rose by 86·8 million kWh or 4·8 per cent, and bulk sales by 124·1 million kWh.

There was an advance generally in the number of kWh sold per consumer. In June, 1945, the new Government generating station at Highbank, on the Rakaia, utilizing surplus water from the Rangitata irrigation race, was opened. It consists of a single unit of 25,200-kW capacity, the largest yet installed in the Dominion.

South African Notes

From Our Cape Town Correspondent

THE chairman of the Electricity and Waterworks Committee of the Cape Town City Council stated recently that it was hoped to have the first of the new 40,000 kW turbo-alternator sets in commission by 1948. Delays in obtaining equipment had made it impossible to bring the set into operation by next winter. A second additional set, making five in all, would be ordered shortly and it was expected that this final set would be working by 1949. The foundations for the building, to house both new sets have already been laid. Recently parts of two boilers arrived and these are being assembled. A second steel chimney will be constructed in the next few months.

The general manager of the Johannesburg Electricity Department, Mr. J. C. Fraser, recently returned from a visit overseas during which he was given facilities for inspecting 24 large engineering works in England and Scotland. At the end of February last year the City Council agreed that Merz & McLellan should be instructed to proceed with the preparation of the necessary plans for the extension of the Orlando power station, and by the end of July the tenders for the boiler plant, turbo-alternators, condensing plant, steel frame buildings, steam and feed piping and valves and boiler feed pumps were received at the consultants' offices. It was hoped to obtain the switchgear tender last month, thus achieving the aim of having all the major contracts placed before the end of 1946.

It has been suggested that the proposed South African Bureau of Standards should eventually take action that will make it obligatory that all plant of certain specifications sold in the Union should conform to the relative British or South African standards. With the object of preventing the sale and purchase of equipment of inferior quality, legislation might be introduced to cover all appliances and wiring material used in electrical installations. With regard to domestic equipment and appliances, such as plugs and sockets, fuses, fuse-holders, switches, lampholders, hot-plates, etc., it is agreed that standardization in respect of physical dimensions as well as quality and design would be advantageous.

A system of factory distribution new to South Africa is being used at the new Goodyear tyre factory in Uitenhage, where open busbars run the length and breadth of the building. Three sets of busbars, carrying 2,200 V for the big machines, 380 V for the lighting and smaller machines, and d.c. for driving the variable-speed apparatus, have been installed. The factory is also being equipped with the latest internal telephone system and signal service, including fire-alarms, call-bells and watchmen's clocks.

COMMERCE and INDUSTRY

I.M.E.A. Convention. Information on Welding Processes.

It has been definitely decided by the Incorporated Municipal Electrical Association to hold its Annual Convention this year. It will be at Bournemouth, from June 23rd to 27th inclusive. As we have already reported, papers will be presented on "The Law Relating to Electricity Supply," by Mr. R. Birt (Ealing); and "Recent Developments in Power Station Practice," by Mr. F. W. Lawton (Birmingham).

Contract Price Adjustment Formulæ

The latest figures for the B.E.A.M.A. contract price adjustment formulæ are as follows:—Rate of pay for adult male labour (January 11th) 110s. (no change). Cost of material: The index figure for intermediate products published by the Board of Trade on January 11th is 204·1 and is the figure for the month of December, 1946.

Coal Situation

Provisional figures issued by the Ministry of Fuel and Power show that during 1946 consumption of coal was again ahead of production. The output of saleable coal amounted to 189·3 million tons, including 8·8 million tons of open-cast coal, as compared with 182·8 million tons in 1945 (8·1 million open-cast). Inland consumption is put at 184·6 million tons (against 178·6 million) and exports and foreign bunkers at 8·8 million tons (8·2 million), giving a total of 193·4 million tons, as compared with 186·8 million tons in 1945. The consumption of coal at electric power stations during the year was 26·2 million tons, against 23·5 million tons, and gasworks took 22·7 million tons, against 21·1 million.

There was a fall in manpower from 706,400 to 696,700 but the output per man-shift rose from 1·00 to 1·03 tons.

F.B.I. and Taxation

Well in advance of the Budget statement, the Federation of British Industries has issued its suggestions regarding future taxation. The Federation is of the opinion that the present high level of taxation is weakening incentives to production and suggests that a reduction in the standard rate of income tax, with increased individual allowances and no rise in the higher rates, would have the effect of stimulating production. It is also thought that no special tax should be imposed on profits, but on the contrary the existing profits tax should be repealed. The Chancellor of the Exchequer is urged to consider the incidence of purchase tax which may act as a deterrent to production in certain industries.

Electrical Display at a Cinema

During the week commencing December 30th, the film "Piccadilly Incident" was shown at the Tower Cinema, West Bromwich. In conjunction with this film, an electrical exhibition, arranged by the West Bromwich Corporation Electricity Department, was held in the foyer of the cinema. This attractive display aroused a good deal of interest, and the staff of the Electricity Department, who were in attendance, dealt with a large number of inquiries.

Display by West Bromwich Electricity Department at a local cinema

Welding and Increased Production

Extended use of the electric welding processes is helping to increase output, simplify assembly operations and to save time and material. During the war years the Service Departments and the Supply Ministries recognized the great importance of welding and set up information services to assist users and potential users of welding.

The B.E.A.M.A. Electric Welding Sections, which worked in close co-operation with Government Departments during the war, aim to carry on these very useful services and will be glad to provide information on the use of electric welding processes, particularly to firms who are contemplating changing their pro-

duction to fabrication by welding. The manufacturers of arc welding electrodes and plant and resistance welding machines who are members of B.E.A.M.A. include experts on all matters connected with electric welding. Particulars are available from the Secretary, Welding Sections, British Electrical & Allied Manufacturers' Association, 36, Kingsway, London, W.C.2 (telephone: Holborn 0502).

Battery Not a "Fixture"

The Basingstoke County Court Judge held recently in a dispute between a landlord and his tenant that a battery used in conjunction with a generating set was not a "fixture." Accordingly the tenant was bound to keep it in order although the premises in which it was situated had been requisitioned by the Government.

On an appeal by the tenant from this decision, the Court of Appeal, on January 14th, upheld the County Court judgment. Lord Justice Morton said that while the engine was bolted to a concrete bed, the battery was on a table in the engine shed. Lord Justice Bucknill, in concurring, agreed with the County Court Judge that the battery was not an essential part of the engine. It was necessary to make the whole scheme effective but the plant would have worked just as well if the battery had been situated elsewhere.

Testing Plastic Mouldings

Suggested methods of testing electrical components made by moulding plastic materials are set out in B.S.1330, which is an interim report (B/T.40) on the results of an investigation carried out by the E.R.A. at the request of the B.S.I. The intention is to explain how miniature specimens may be cut from the finished moulding and the way in which such specimens can be tested as a means of effecting control over their production. The document is obtainable for 7s. 6d. post free from the British Standards Institution, 28, Victoria Street, London, S.W.1.

Dangerous Occurrence Notification

Under Section 65 of the Factories Act, 1937, the Minister of Labour and National Service on January 7th, made the Dangerous Occurrences (Notification) Regulations, 1947 (see advance notice in the *Electrical Review* of November 8th, 1946, p. 743). The Regulations come into force on February 1st. Copies may be obtained from H.M. Stationery Office or through any bookseller, price 1d.

Argentine Import Control

New regulations governing the importation of certain goods and commodities into Argentina involve the imposition of the following quotas for the first half of 1947: Lead-sheathed copper wire or cables, 100 tons; insulated wires or cables for underground use, with interior lead covering and outer sheathing of steel or iron, 500 tons; plates and resistances for electric cookers, 5,000; incandescent lamps (excluding fluorescent tubes), 1,500,000; and batteries, 200,000. Electric motors and generators above ¼ H.P., machinery and compressors, including air pumps and refrigerator units, are among articles the importation of which is subject to "prior study."

Brush South African Agreement

The Brush Electrical Engineering Co., Ltd., announces that it has made an agreement with New Union Goldfields, Johannesburg, and with Brush (South Africa) under which the latter acquires the right to manufacture under royalty the products of the parent company. It is proposed as a first step to undertake the manufacture in South Africa of the Petter petrol/paraffin air and water-cooled engines and small Brush transformers.

New Union General Industries (a subsidiary company of New Union Goldfields) is acquiring the whole of the issued share capital of Brush (South Africa) and is arranging for the First Electric Corporation of South Africa (another subsidiary company of New Union Goldfields) to undertake the manufacture of these products in its new factory on the Rand, under licence from Brush (South Africa). In addition to selling the products of the First Electric Corporation, including the Petter engines and Brush transformers, Brush (South Africa) will continue, under its existing long-term agreements, to act as agent for the Brush Electrical Engineering Co., British Oil Engines (Export) and other well-known English companies.

T.V.A. Finances

Commenting on the annual report of the Tennessee Valley Authority, the Edison Electric Institute contends that its apparent profit has been obtained by charging to other operations costs which private bodies would have had to charge to power supply. The Institute declares that, including $88 million in interest on money advanced by the Treasury, the total deficit on the T.V.A. Scheme so far amounts to approximately $95 million.

Apprenticeship Training Scheme

Dewrance & Co., Ltd., have issued a booklet entitled "An Engineering Career," in which particulars are given of the company's apprenticeship training scheme and descriptive notes of the various works departments in which apprentices are trained. The booklet contains a number of excellent illustrations of sections of the company's works.

Ironmongers' Guide

The 1947 edition of "*The Ironmonge* Yearbook and Hardware Buyers' Guide" follows much the same form as in preceding years. It contains a great deal of information of interest

to those in the hardware trade. Its contents includes a buyers' guide to hardware, trade marks and brands, a list of Government Departments, and a list of associations. Useful articles include "Goods Price Control," "Forming a Company," "Patents and Design," hints for applicants for trade marks, and points to be borne in mind when dispatching goods by rail. The Guide is published at Essex Street, Strand, London, W.C.2, and is issued to those who subscribe for *The Ironmonger*.

Production and Man-Power

In a White Paper issued this week (Cmd. 7018, Stationery Office, 2d.) the Government makes a "Statement on the Economic Considerations Affecting Relations between Employers and Workers." This stresses the facts that production is still far below the needs of the home and export markets and that unless output is considerably increased it will be difficult to maintain the stability of prices and order in our industrial system. Although the total labour force is greater than in 1939 the net available labour, after deducting non-productive classes, is less.

There is an urgent need for greater output per head and increases in wages can be made safely on this basis only.

Power Engineers' Salaries

As the variation in the cost-of-living index figure during the latter half of last year was insufficient to affect the existing salary schedule of the National Joint Board of Employers and Members of Staff (Electricity Supply Industry) power engineers' salaries will remain at the figures given in the *Electrical Review* of April 26th, 1946, for the first six months of this year.

World Power Conference

After twenty-three years at 36, Kingsway, W.C.2, the Central Office and office of the British National Committee of the World Power Conference have removed to new and more commodious premises at 201-202, Grand Buildings, Trafalgar Square, W.C.2 (telephone: Whitehall 3966).

The first post-war edition of the "List of National Committees and Representatives" has been issued and copies are now obtainable from the Secretary of the International Executive Council, Mr. C. H. Gray, at the above address. There are at present twenty-six National Committees and seven other countries possess accredited representatives, giving a total of thirty-three member-countries.

Scottish Works Extension

A large-scale factory extension is planned by Philips Hamilton Works, Ltd., Lanarkshire, Scotland. Designed for completion by 1950, this extension, itself taking about 240,000 sq ft on a 15-acre site, will bring the total area occupied by the factory to about 405,000 sq ft.

Employment will ultimately be found for approximately 2,500 workers (40 per cent male). By the end of 1947 the number of workers on the pay-roll is likely to exceed 1,200.

The projected extensions will comprise three new factory buildings and a large store. A tunnel will connect the main factory with these additions, which are planned to occupy a site on the other side of a road. The new factories will stand well back from this road to facilitate any widening operations that may become necessary.

Philips' East Indies Factory

It is reported that the Philips Incandescent Lamp Company's works at Sourabaya will resume production in the near future. After the liberation of the Dutch East Indies the machines were found to be in fairly good condition, but all tools and raw materials had been removed. These losses have now been made good with replacements from Eindhoven. —*Reuter*.

Colliers for Portsmouth

Despite the impending nationalization of all electricity undertakings, the Portsmouth City Council decided at its meeting on January 14th to accept the tender of P. Austin, shipbuilders, to build two colliers at a cost of £265,188. The Electricity Committee estimated that there would be an annual saving on transport costs of £26,550.

Trade Publications

W. T. Henley's Telegraph Works Co., Ltd., 51, Hatton Garden, London, E.C.1. Catalogue (D) of metal-sheathed, paper-insulated cables, for use in mines and quarries at 660 V, 3·3 and 6·6 kV.

Metropolitan-Vickers Electrical Co., Ltd., 1, Kingsway, London, W.C.2.—Illustrated and priced catalogue (No. 7101/2-2) of all types of "Metrovick" and "Cosmos" lamps; also folder (ES.4018/4-1) on infra-red paint-stoving equipment.

A. J. Evans & Son, 3, Fulbourne Street, Whitechapel, London, E.1.—Abridged wholesale price list of accessories and stock lines.

Asbestos Jointings, Ltd., County Chambers, Corporation Street, Birmingham, 2.—Leaflets on "Roofix" plastic water-proofing compound and "Neoprene" cork jointing.

W. Christie & Grey, Ltd., 4, Lloyd's Avenue, London, E.C.3.—Illustrated brochure and pamphlets on methods of reducing machinery vibration and noise and of sound-proofing buildings.

British Industrial Plastics, Ltd., Ideal House, 1, Argyll Street, London, W.1.—Publication of the "Beetle Magazine," which is the house organ of the group of companies subsidiary to

British Industrial Plastics, Ltd., is to be resumed thrice yearly as before its suspension in 1941. The first post-war issue contains an account of B.I.P. progress during the past ten years and an article on the wartime achievements and future prospects of Beetle cements.

Dawe Instruments, Ltd., Harlequin Avenue, Great West Road, Brentford, Middlesex.—Illustrated catalogue of radio, electrical measurement and stroboscopic apparatus.

Air Conditioning & Engineering, Ltd., 3, Bayley Street, Tottenham Court Road, London, W.C.1.—Illustrated folder describing "Aircon" industrial unit-type heaters.

Further Disposal Sale

A further sale of surplus goods to be held by the Ministry of Supply on Wednesday, January 29th, at the Ministry of Supply Depot No. 91, Bainton, near Stamford, Lincs, consists of a wide range of plant and equipment portable forges, pumps, washing machines, small tools, a telephone switchboard, etc. A quantity of radio and electrical equipment is also listed for sale. Further information and catalogues (1s. each) may be obtained from Richardson, auctioneers, 15, Barn Hill, Stamford (telephone: Stamford 3315).

Doncaster Exhibition

The Doncaster Engineering Society (hon. secretary, Mr. H. Bramley) is holding its second "Products of Engineering made in Doncaster" exhibition from February 15th to 22nd inclusive. The exhibition is being held in the Doncaster Technical College hall and about twenty firms are participating, together with the Doncaster Model Engineering Society.

Calendars, etc.

The Electrical Trades Union has sent us a calendar on each monthly slip of which there is a slogan in support of electricity supply nationalization.

The calendar of C. A. Parsons & Co., Ltd., has large monthly sheets each bearing a well-executed drawing of various machines in the company's shops. On the back of each sheet there is a technical note about the subjects illustrated.

B. & H. (Nottingham), Ltd., has sent us two tasteful calendars. One has a colourful picture of Alton Towers by Noel H. Leaver, and the other, "Seeing's Believing," is an old-world picture of an angler producing a fish in corroboration of his story.

Premier Electric Services, Ltd., have sent us a well-produced folding desk blotter (gilt lettering on black) with memo pads.

Rolling Mill Purchase

Thos. W. Ward, Ltd., Albion Works, Sheffield, have purchased the whole of the share capital of Birchley Rolling Mills, Ltd., Oldbury. The company will continue to operate under the present name. Messrs. H. W. Secker (chairman and managing director), C. L. Fry, W. W. Hickman, R. B. Trotman, S. J. Dyal, A. J. Wainford and P. T. Ward, have been appointed directors of the company.

Trade Announcements

Wild-Barfield Electric Furnaces, Ltd., has acquired more commodious premises for its Birmingham office and service depot at 21, Steelhouse Lane, Birmingham, 4 (telephone: Central 6372). There is no change in the address of the associated company, G.W.B. Electric Furnaces, Ltd.

The Radio Gramophone Development Co., Ltd., of Bridgnorth, Shropshire, has now opened a new branch in Birmingham comprising showrooms and dealers' service depot at 187, Corporation Street, Birmingham, 4 (telephone: Birmingham Central 2403). Mr. H. Burbridge has been appointed acting manager.

Youngley, Ltd., sign and fluorescent lighting specialists, are opening shortly at 408, Edgware Road, London, W.2, and ask for manufacturers' catalogues to be sent to their head office at 168, Victoria Street, S.W.1.

Litecraft Products, wholesale electrical distributors, have moved to larger premises at 7, West Campbell Street, Glasgow, C.2.

Louis G. Ford, Ltd., Eastbourne, have now established a separate wholesale electrical section with a new trade counter and showroom facilities.

Trade Marks

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from January 15th:—

MILLER-MULTIPOL. No. B643,706, Class 7. Lighting dynamos for vehicles.—H. Miller & Co., Ltd., Monarch Works, Aston Brook Street, Birmingham, 6.

ERINEX. No. 641,631, Class 9. Electrical apparatus included in Class 9. Also No. 641,632, Class 11. Lighting and heating apparatus.—Erinex, Ltd., High Street, Flore, Northampton.

NICO. No. 641,022, Class 11. Electric lighting fittings, hotplates, curling-tong heaters and hair dryers.—Nico Light Engineering Co., Ltd., 1, Laud Street, Croydon.

CRINOLITE and CRINOTHENE. Nos. 644,232 and 644,234 respectively, Class 11. Lamp shades and installations for lighting, heating, refrigerating, drying and ventilating.—Imperial Chemical Industries, Ltd., Wrexham Road, Slough, Bucks.

DENCO. No. 644,276, Class 17. Polystyrene plastics in the form of tubes, rods and sheets for electrical insulating purposes.—Denco (Clacton), Ltd., 357-359, Old Road, Clacton-on-Sea, Essex.

NEW BOOKS

Transmission Line Theory.

Electrical Transmission in Steady State. By Paul J. Selgin. Pp. 427; figs. 99. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C.2. Price 25s.

This book, we are told, grew out of a set of notes prepared for lecture courses given at Brooklyn Polytechnic under the "War Training Program," but bears little resemblance to the original and has an altogether different character. It "aims primarily at broadening and strengthening the foundations"; and it will certainly provide excellent material for those who desire to build their knowledge of transmission and allied matters upon good sound foundations. As the title indicates, transient phenomena are excluded. It begins with a consideration of networks and chains of networks, transmission loss and insertion loss, decibels and nepers, all explained clearly with the aid of examples. The second chapter deals with iterative chains, matching, and image impedance. The network theory is then applied to transmission lines and the transmission formulæ are evolved and discussed, first without reflection and then with reflection. Voltage distribution along lines and standing wave ratios are discussed and graphical methods developed, followed by the use of lines as matching devices, quarter-wave lines, stubs, etc., all set out very clearly with many diagrams of graphical constructions.

In Chapters XI and XII the author leaves transmission lines and briefly reviews electromagnetic theory and then considers Maxwell's equations and their application to circuit elements, but always with his eye on the transmission line. Then follows a chapter in which Maxwell's equations are applied to the solution of the problem and the results linked up with the network solution. The concluding chapters deal with allied matters, such as inductive coupling and transformers, capacitive coupling, and the gain of amplifiers.

Great use is made of the "make and break" network theorem, described fully by Helmholtz in 1853, but usually ascribed to Thévenin, who resurrected it thirty years later. The history of this theorem was traced in *Wireless Engineer* of July, 1943, and in the August number Dr. Bloch historically surveyed the dual theorem in which the constant e.m.f. generator with series impedance is replaced by a constant-current generator with a shunt admittance. Now in the book under review the author uses both forms and not only refers to the former as Thévenin's theorem, but describes the latter as Norton's theorem. He gives no reference or reason for attaching this name to the theorem; it is shorter than Helmholtz-Russell, the name suggested by Dr. Bloch, but then so is Selgin.

Steam Generation Practice.

On p. 80 the author makes a serious mistake when, after defining frequency distortion he calls it *amplitude distortion*, but says that it is sometimes called *frequency distortion*. He apparently thinks that these are two names for the same thing. There is a printer's error on p. 276 where the velocity in air is given as 3×10^3 m/sec.; capacitance—or capacity as it is called in the book—is sometimes given in μF sometimes in μf and sometimes just μ. On the question of notation the author adopts standard practice in the use of capital letters for root-mean-square values and small letters for instantaneous values, but we think it unwise to use $\hat{I}$ and $\hat{V}$ for maximum or peak values, which are really only special instantaneous values; surely it would be better and neater to use $\hat{i}$ and $\hat{v}$.

Apart from these minor defects, the book is one that can be confidently recommended to any student wishing to get a good grounding in electrical transmission from the point of view of the communications engineer.—G.W.O.H.

An Introduction to Transmission Lines. By C. J. Mitchell, A.M.I.E.E. Pp. 64; figs. 30. George G. Harrap & Co., Ltd., 182, High Holborn, London, W.C. 1. Price 3s. 6d.

The author of this booklet, formerly lecturer in radio communication at one of the Polytechnics in London, approaches a complicated subject in a simple mathematical way to impart an insight to difficult radio-frequency phenomena. He bases his treatment on fundamental laws, first explaining why inductance and capacitance in an infinite line are pronounced before resistance becomes apparent, thus leading up to the calculation of characteristic impedances from the dimensions of a practical transmission line. The second and third chapters are concerned with travelling waves and their reflection, both steady and pulsed d.c. voltages; while the fourth is devoted to a.c. wave length and phase angle calculations in explanation of standing waves.

The fifth chapter outlines the vector relationship between current and voltage to determine the effects of impedance, so indicating the necessity for matching, by several means described in the last chapter, the aerial load to the feeder line.—W.O.F.

Electric Motors and Generators. Pp. 384; figs. and index. Odhams Press, Ltd., Long Acre, London, W.C.2. Price 9s. 6d.

This book has been correctly described as an up-to-date practical guide for all those interested in the generation and application of electricity. It is a rather ambitious attempt to deal with the subject in a way that is likely to appeal to users

of electrical plant, and even to the general reader. The guide should also be of interest and assistance to electrical engineering students, many of whom are required to undertake theoretical work in connection with certain machines of which they have had no practical experience. Students' textbooks sometimes suffer from the disadvantage that little or no attempt is made to show the relation between theory and practice; often a practical explanation will give the student a much clearer idea of principles than will a few pages of mathematics, besides being more interesting. This book is essentially a practical one covering construction and operation of the machines, although notes on theory and design have been included. The work is profusely illustrated.

A considerable amount of information is given in connection with the construction, windings, and characteristics, of various types of motors and generators, whilst control gear and prime movers are also described. One chapter deals with casing design and ventilation and there are notes on boosters and traction generators. About seventy pages are devoted to installation, testing, commutation, and maintenance; in these pages mechanical details of foundations, belt, chain, and gear drives, are not neglected. These subjects in particular should appeal to plant users, although they could have been treated more extensively. This class of reader would no doubt have appreciated rather more information relating to modern protective gear, power factor correction, effects of abnormal conditions, construction of earthing connections and kindred matters.

Although the authors have avoided the use of complex mathematics an appendix has been included which explains basic electrical theory from Ohm's Law to vectors.—J.L.W.

Steam Generation. By J. N. Williams, M.I.Mech.E., F.C.S. Pp. 372; figs. 93, Evans Bros., Ltd., Montague House. Russell Square, London, W.C.1. Price 25s.

In its nineteen chapters this book covers a wide field and should prove useful to both industrial and power-station engineers and also to operatives. The fundamentals of combustion are discussed in the first chapter, which is followed by one dealing in a general manner with draught (chimney and mechanical) and its measurement and regulation, air supply, volatiles, flue-gas analysis and the significance of CO_2. Radiation, convection and conduction of heat, deposited layers and temperature gradient through a boiler are next discussed. Properties of steam are briefly outlined.

Shell-type boilers of various types and water-tube boilers are described in detail. In the latter case walls, furnaces, marine-type and forced-circulation boilers and availability are dealt with in a descriptive manner and the principal features embodied in many present-day designs are included. The information given on mechanical stokers could be extended with advantage and mention should be made of the spreader type. The chapter dealing with superheaters, economizers and air heaters is instructive, but the section appertaining to air preheaters is rather curtailed having regard to the pronounced corrosion and fouling of air heaters in recent years.

The author has dealt creditably with the main features of boiler operation. These include hand firing, fire cleaning, air infiltration, dampers, gas temperatures, banking fires, boiler efficiency, boiler losses, moisture in coal, combustion in ash, unburned gases and soot and smoke formation.

The chapter on coal is most informative but in future editions the author may care to substantiate his statement that "the multiple-retort gravity underfeed stoker has greater capabilities than the chain-grate stoker when burning either average quality or difficult coals." Only one page is devoted to ash handling, and there is scope for a wider treatment of this important boiler-house adjunct.

The chapter on oil-fired boilers is of topical interest, but the summary of comparisons between stoker and pulverized-fuel plants might have been supported by actual figures in each section as a guide to prospective purchasers. The notes on automatic boiler control should serve as an introduction to the subject, but particulars of the "unified" system, used in many recent installations, should be added.

Although refractories are covered in some detail, including expansion, wastage, melting points, fluxing and spalling, slagging, temperature control and insulation, more space might have been given to lagging, which does not always receive the attention it deserves: also the use of glass silk merits mention.

The chapter on boiler water, which deals with cleanliness of evaporating surfaces, priming, corrosion, embrittlement, water treatment, steam purity and blow-down, is most interesting and although rather condensed should prove very useful to boiler operatives. The description of flue-gas cleaning is clear, but it could be extended with advantage by illustrations of typical plants.—T.H.C.

Electrons. By "Ediswan." Pp. 16; figs. 15. Edison Swan Electric Co., Ltd., 155, Charing Cross Road, London, W.C.2. Available to educational establishments only upon application.

This booklet (R.1262) is the first of a series of six, mainly intended for elementary educational purposes. Their object is to serve as an introduction to the operation of radio valves, explaining in simple terms the functions of the various classes, each of which will be dealt with in a differently coloured booklet. The first one (red) diagrammatically indicates electron flow, illustrates electrode assemblies in diodes and explains their uses as detectors and rectifiers.—W.O.F.

Making Vacuum Cleaners

New Scottish Factory in Production

TO relieve pressure on productive capacity at Leatherhead, the British Vacuum Cleaner & Engineering Co., Ltd., has opened a new factory at Broxburn, near Edinburgh, for the manufacture of domestic type vacuum cleaners. Extending over 25,000 sq ft this new establishment, which is one of the most recently constructed Government standard factories, will provide facilities eventually for making 3,000 cleaners a week and is already turning out 1,200 a week. At present about 200 persons are employed, but as production expands this number will be increased to 350. There are also plans to erect another factory of 50,000 sq ft floor area on another site at Broxburn on the main Glasgow-Edinburgh road.

Assembly of motors and bodies

Cleaner undergoing its suction test

Initially manufacture is being concentrated entirely on the Goblin "Monarch" outside-bag type cleaner with revolving brush, but later the "Wizard" model will also be produced in the factory. In addition to its use as a carpet cleaner and floor polisher this model, by removal of the handle, can be used in the hand for cleaning stairs, upholstery, car interiors, etc.

For the sake of lightness aluminium is used largely in the construction of the units. Castings for the scroll bodies and the motor housings are received in their rough form and machined and drilled. After machining, the body castings and motor housings are stove enamelled or polished. In various sub-assembly stages the various components—motor, motor housing, body, wheels, revolving brush, rubber buffer, etc., are fitted together, the motor being rubber mounted in a double casing.

Every motor receives an hour's running test

When the assembly is completed, every cleaner is given one hour's running test preparatory to undergoing

tests to check current consumption and suction under varying loads. After a final polishing and inspection it is passed on for wrapping and packing.

Meanwhile at the other side of the factory the bags are cut out twenty at a time by electric shears and are machined and ironed, and the bag fittings assembled. The handles, received at the factory in rough form, have their rough edges removed and are then degreased and stove enamelled. After being fitted with rubber handle-grips, switch, hooks for cable, and wired with flexible cord of correct length, each handle is tested and inspected before being packed in its carton.

Mr. T. H. Lury, the general manager, who kindly showed us round the factory, told us that the opening of the new premises will enable the Leatherhead works to increase its output of other types of cleaners and also electric clocks, as well as producing a number of new lines.

Another new factory near Belfast is producing the "Goblin-Teasmade" set, the alarm-clock-cum-tea-making apparatus which was becoming so popular before the war, and another device for rendering the waking process less unpleasant, a radio set fitted with a clock which switches itself on at the appropriate time.

Canadian Market

Survey of Conditions and Possibilities

AS the result of a recent visit to Canada for the purpose of making a two-months' survey of the market for some important trade interests, Mr. T. Lawson-Noble has prepared some useful notes, a copy of which has reached us.

Mr. Lawson-Noble made contacts with many large firms, eleven trade associations, and British Trade Commissioners; in Ottawa, with directors of divisions in the Department of Trade and Commerce, Reconstruction and Supply Department, and the chief engineer and chief architect of the Public Works Department; and in Montreal the superintending engineer of the Quebec Hydro-Electric Commission.

It is certain that only the highest grades of outstanding value in plant and equipment will win Britain trade and repeat business in world markets when the present sellers' market gives way to intense competition. This is particularly applicable to trade with Canada.

Out of the total Canadian imports of $879,874,953 for the six months ended June, 1946, the United States share amounted to $618,367,109 against Great Britain's $110,894,212. The greatest handicap to imports from Great Britain is the long and often impossible delivery period, and here trading on a consignment basis whenever feasible through local agents acting as stockists is helpful. According to the type of product, three and even up to six months' shipment would be agreed to for goods required from the United Kingdom. In certain instances for reasonably early delivery prices over "ceiling" limits would be paid. In the case of a particular type of specialized plant and equipment, an order was recently placed in this country, approximately $4,000,000 in value, with a delivery period of two years. A special effort is being made to improve upon this and is a condition of the contract, but this order was only booked because of the difficulty in obtaining supplies elsewhere.

Representatives from Britain often visit Montreal, Toronto and possibly Vancouver, but neglect to visit Hamilton, Winnipeg, Regina, Calgary and Edmonton, all important centres with rapidly expanding populations. With coal and iron resources providing a basis for industrial development Edmonton, for example, has become the railhead for the northern part of the Dominion.

Facts worth recording are that the gross value of manufactured products of Ontario in 1942 represented about 50·5 per cent of the total for the whole Dominion, while that of Quebec amounted to about 31 per cent. Quebec, the largest province of the Dominion, alone equals in size the combined areas of France, Germany and Spain.

In Canada mechanical power, particularly electric motors, has been increasing in manufacturing industries during the past decade, much more rapidly than the number of employees. Electricity, principally from water power is displacing coal and oil to heat furnaces and ovens, and is doing an enormous amount of work in electrolytic refining of metals, production of fertilizers, metal plating, etc.

Mr. Lawson-Noble says that he is shortly undertaking an extensive market survey journey to India, Australia, China and other parts of the Far East.

I.E.E. South Midland Centre

The South Midland Centre of the Institution of Electrical Engineers is reviving its annual dinner on February 7th at the Grand Hotel, Birmingham. Tickets can be obtained from Mr. H. Hooper, hon. secretary, c/o Central Electricity Board, 53, Wake Green Road, Birmingham.

Swiss Conditions

Impressions Gained During a Recent Visit

By J. Mortimer Hawkins

RECUPERATING after a recent illness I recently spent some time in Switzerland and took the opportunity to meet some leading personalities in the electrical industry of that country, and from these meetings and visits to several factories and to an electric farm, some impressions have resulted which may be of interest.

In the first place, I met Mr. Josef Blankart, of the Swiss Central Electric Supply Company, which serves mainly an agricultural region, and from him I learned that Swiss tariffs are comparable in structure and price range to our own and that the Canton of Lucerne is supplied both by the town supply authority and the Swiss Central Electric Supply Co. The confusion arising from this seems not unlike our own, where we not only get two different supply companies in the one building, but we confound confusion by having one supply d.c. and the other a.c.

In Switzerland, however, the two authorities split, as to the town of Lucerne and the Canton of Lucerne. For the main part, the former is supplied by the equivalent of a municipal undertaking, and the latter by private enterprise with statutory obligations. The voltages vary from 145/240 to 220/380 and 280/480, but there is an endeavour to standardize nationally on 220/380 V.

More Work and Higher Wages

The incidence of trade unionism is confined to a society which fixes minimum rates of pay for all levels of technical personnel. Working conditions are blessed with much more flexibility and realism than in England, with the inevitable result that more work is done and higher wages are *earned* and paid.

Electrical generation is, of course, confined to hydro-electric stations, but when the natural water power supply fails because of freezing up from November to March, the Swiss have to rely on artificial lakes for their water power. During the war, construction of these artificial lakes was at a standstill, so that now there is a considerable discrepancy between supply and demand in the critical months. Let there be no doubt that the Swiss man-power problem during the war years was very acute. All available men were mobilized to guard the frontiers, and in spite of Mr. Blankart's technical status and his being several years my senior (I think) he found himself in the Army for three years sitting a horse across mountain passes to which I would be allergic on my own two feet.

The war has been directly responsible for arresting electrical development in Switzerland, and, therefore, space heating is something which just cannot be accommodated during the critical months– that is to say, cannot be accommodated in traditional style. But the Swiss are not a race to respect tradition in the solution of a problem. They know that they have a surplus of power available in the summer months because the water supply is plentiful. Therefore, they are now carrying out experiments to pump all unwanted summer power as heat into the prepared rock foundations of a school building. This stored heat energy will be tapped and distributed in the winter months by circulating fans and it is estimated that they will achieve at least an 85 per cent thermal efficiency.

Electricity in Agriculture

Another summer load which is being developed is in agriculture. Grass drying in long ovens loaded with 1,000 kVA of heating, plus circulating fans and operating motors, gives farmers cattle food for the winter, which, by virtue of the quick drying, retains a very high percentage of vitamins and nutritional value. There are seven or eight such plants in the Canton of Lucerne; the charge to the farmer for drying his grass is attractive, and the returns on the capital invested by the Swiss Central electricity authority is interesting because surplus energy is used costing only 1·6 centimes (less than a farthing) per kWh.

This experimental farm is equipped with soil heating installations, greenhouse heating, fowl perch heating and lighting, and ultra-violet treatment for high egg production. It also has electric pig food mixers, milking machines, cider presses and apple drying ovens.

I feel, however, that we in this country are at least as far advanced in agricultural electrification as the Swiss, and maybe an

exchange of views and methods in detail would be of mutual benefit. Switzerland has had to conserve her food supplies very much and I discovered refreshing realism in seeing apple rings and walnuts drying in the turbine house and the e.h.v. switch rooms. The simple reason given was that there was heat which would otherwise be wasted and I could not help but wonder what our E.T.U. would do if its members found themselves asked to work alongside apple rings and walnuts.

I inquired about the reaction of the supply industry to fluorescent lighting, and I gathered that there was a certain apprehension that the higher efficiency light source would mean a drop in consumption. There seemed to be little enthusiasm for this form of lighting, and there was certainly little evidence of installations in any of the principal cities which I visited.

I found in a large factory where continuous high precision work was in progress everywhere that the standard of lighting was low according to our I.E.S. code. There were many local lights, the glare from some of which was described by the operatives as "necessary." There were a few general lighting units, but they were far apart. When I commented on this, I learned that the position of the lights was traditional and that there would be very serious trouble if revisions were attempted. Each operative is very conscious of the importance of his own idiosyncrasy, and I think that before any general recommendations for lighting technique for the watch-making industry (for instance) are attempted, it would be advisable for lighting engineers to study most carefully the particular problems.

Domestic electrical appliances exist in profusion, but unless my eye was prejudiced, I think that the industry would benefit by asking industrial designers to have a look at the shape of their irons and toasters and other such devices which seem to me to entirely ignore the importance of "emotional" appeal. I hope that my Swiss friends will forgive my presumption in daring to be critical, but my intention is entirely complimentary, and I shall remember with gratitude their generous hospitality.

United States Exports

THE American Government has published some interesting details regarding the export trade of the United States in electrical goods. They give a comparison between the quarterly average for 1936-38 and the four quarters from Michaelmas, 1945, to Midsummer, 1946, for the total value and for the values of some of the leading groups, differentiating in cash purchases. These figures are given in Table 1.

Total imports of electrical machinery and apparatus during the quarters mentioned were valued at $1,100,000, $300,000, $700,000 and $900,000 respectively compared with a quarterly average of $600,000 for 1936-38.

The percentages of the total value represented respectively by exports under lend-lease and for UNRRA are given in Table 2.

TABLE 2—PERCENTAGES UNDER LEND-LEASE AND FOR UNRRA

Type of Equipment	Exports under Lend-Lease		Exports for UNRRA	
	July-Sept., 1945	April-June, 1946	July-Sept., 1945	April-June, 1946
Generators, etc.	54·7	39·6	0·7	4·4
Motors, etc. ..	15·4	45·9	—	1·3
Refrigerators and parts ..	1·7	0·2	—	0·8
Appliances, household and domestic, except lamps ..	3·7	0·2	—	—
Radio apparatus	73·6	2·5	—	—

TABLE 1—QUARTERLY EXPORT VALUES

Type of Equipment	1936-38 quarterly average $ (000)	July-Sept., 1945 $ (000)	Oct.-Dec., 1945 $ (000)	Jan.-March, 1946 $ (000)	Apr.-June, 1946 $ (000)
Electrical machinery and apparatus	25,500	57,900	51,000	61,000	67,600
Cash purchase	25,500	29,100	34,700	43,900	54,500
Generators and generating sets	1,200	10,400	10,600	11,200	13,700
Cash purchase	1,200	4,600	4,300	6,100	7,600
Motors, starters and controllers	1,900	3,900	7,500	8,100	7,200
Cash purchase	1,900	3,300	3,500	3,500	3,800
Electrical refrigerators and parts	4,800	1,000	2,100	3,800	4,500
Household refrigerators	2,900	100	300	1,400	1,900
Electrical appliances: Household and domestic, except lamps	1,400	400	800	1,500	2,300
Radio apparatus	7,000	16,500	5,600	8,000	10,100

ELECTRICITY SUPPLY

North Wales Development Hampered. Peterborough Extension Scheme.

Bedford.—SUPPLY IMPROVEMENTS.—The Electricity Committee is to augment the supply in the southern area (£15,710) and at Sandy (£13,773).

Blackpool.—CATERING EQUIPMENT.—The Town Council has referred back for further consideration a scheme prepared by the borough electrical engineer for resuming the hiring of heavy-duty catering equipment. It was argued in Council that the scheme would become uneconomic especially in the latter part of the hire period, when maintenance of old equipment would be very expensive.

LOAN APPLICATION.—The Electricity Committee is seeking sanction to borrow £100,000 for mains, services and substations and £35,000 for meters.

Bolton.—LOCAL AUTHORITIES AND STREET LIGHTING.—Desirability of the zoning of lighting was stressed by Councillor H. Kitchen, chairman of the Corporation Lighting Committee, at the annual inspection by the Committee. He said that at present near Newcastle there was a stretch of road 42 miles long, dependent on no fewer than 22 different local authorities for lighting. Just as Bolton was a centre for the supply of electricity from Back-o'th'-Bank, he would like to see the town as the centre of a lighting zone. As far as possible gas lighting would be removed and electricity provided in its place, but progress in this field had been slowed down owing to lack of manpower and materials.

Bradford.—TRACTION SUBSTATION.—At a cost of £15,257 the Electricity Committee is to lay cables and build a traction substation in Gilpin Street.

Burnley.—HOUSE INSTALLATIONS.—The Housing Committee has arranged for the Electricity Department to undertake electrical installation work in 34 houses on the Avenue estate at a cost of £1,276.

Burton-on-Trent.—SUPPLY TO TICKNALL.—The Electricity Committee is to provide a supply to the Ticknall area at a cost of £12,190.

Dartford.—SUPPLY SCHEME.—The Electricity Committee has approved a scheme for meeting the requirements of the Temple Hill housing estate and the factory area.

Dumfries.—RING MAIN.—Town Council is to extend the 3,300-V distribution system and to construct a high-voltage ring main at an estimated cost of £9,884.

Gateshead.—STREET LIGHTING.—The Town Council has applied for sanction to borrow £104,935 for an electric street lighting scheme.

Lowestoft.—REVISION OF REGULATIONS.—The manager of the Electricity Department has been asked to revise the regulations regarding electrical equipment in buildings. It was reported that the majority of contractors carried out good work, but it was impossible to prevent people from buying installation materials of an inferior quality and carrying out extensions themselves which were often dangerous.

SUPPLY TO WORKS.—An a.c. supply is to be provided at a cost of £250 to Chromeglaze, Ltd., at Ness Point works.

North Wales.—CUTS MINIMIZED.—At the quarterly meeting of the North Wales and South Cheshire Joint Electricity Authority held at Llandudno, it was reported that foresight and improvization shown by the North Wales Power Co. and the local distributing authorities had prevented serious electricity cuts in the area. Col. Rankin said the power company had taken over a redundant factory with useful electrical plant at Marchwiel, near Wrexham, and with this it was able to generate an additional 5,000 kW.

The North Wales Power Co. reported there were 938 new consumers, bringing the total to 61,744 receiving domestic and other supplies from them direct. Col. Rankin said that the lack of materials was still holding up development work. Since the war ended schemes costing £507,500 had been authorized, chiefly for rural development, and work costing £167,500 had been carried out. He stated that the G.P.O. received two-thirds and the electricity companies one-third of 30,000 poles imported to Great Britain. As the North Wales Power Co. alone used 6,000 poles a year under normal conditions, future prospects for rapid development were not very bright.

Peterborough.—POWER STATION EXTENSION.—The City Council has been directed by the Central Electricity Board to extend the Albert Meadow generating station by the installation, ready for commercial operation by September, 1950, of two 20,000-kW turbo-alternators, boiler units and ancillary plant, together with buildings and civil engineering works. The City Council has prepared a scheme for the reconstruction of the generating station to provide for a maximum plant capacity of 80,000 kW at a cost of £3,000,000, and the direction now received is in respect of the first stage of this scheme, which is estimated to cost £1,770,000. The main contractors so far selected by the City Council are:—Turbines and electrical equipment, English Electric Co., Ltd.; boilers, pipework and coal handling plant, Babcock & Wilcox Ltd. Sir Alexander Gibb & Partners have been appointed consulting engineers and architects in respect of the civil engineering work.

The question of amenities has been discussed with the Peterborough Cathedral authorities

whose architect is to confer with the Corporation's consulting architects in the design of the buildings, chimney, etc.

Scunthorpe.—ANNUAL ACCOUNTS.—Through the misplacing of a decimal point the cost per kWh sold figure for the last pre-war year was given incorrectly as 11·37d. instead of 1·137d. in our January 17th issue (p. 123).

Torquay.—PREPAYMENT METER RENTAL.—The Electricity Committee has increased the hire charge for prepayment meters from 2s. 6d. to 4s. per quarter.

ELECTRICITY FOR ESTATE.—An electricity supply is to be given to the Coombe Pafford estate at a cost of £5,665.

Watford.—SERVICE CHARGES.—The Electricity Committee has increased service charges from 6s. to 9s. per yard for 2-core, with a further 6d. and 1s. per yard respectively for 3- and 4-core services.

POWER STATION CANTEEN.—The Committee has approved a scheme for a canteen at the power station to be managed by the employees.

York.—STORES AND WORKSHOPS.—Premises in Bishophill are to be purchased by the Electricity Committee for stores and cooker workshops.

Overseas

Australia.—TASMANIAN PROJECTS.—A new 30,000-H.P. hydro-electric plant is to be built on the South-Esk River, near Launceston, Tasmania. The Hydro-Electric Commission has also approved system extensions costing £192,525, including £115,685 for an 88-kV transmission line from Burnie to Smithton.

Austria.—TRANSMISSION LINE.—An Italian company is to erect a 100-kV line in Austria to connect the Vorarlberg power station with the Tyrol. The line is scheduled for completion next winter and will cost 500 million lire.—*Reuter's Trade Service.*

Eire.—RURAL DEVELOPMENT.—Last week saw the official inauguration of an electricity supply at Kilsallaghan, Co. Dublin, selected by the Electricity Supply Board as the first rural district for connection under the development scheme. A demonstration of the uses of electricity in homes and on farms was given on January 15th at Oldtown, in the Kilsallaghan area. Talks were given on how electricity could facilitate the work of the farmer, and there was a film show on the applications of electricity. During the year the E.S.B. hopes to provide electricity supply to at least one rural area in each county.

France.—LARGE WATER-POWER PROJECT.—Over a thousand workmen are employed on a four-year task of building five power dams in Central France, involving the removal of several villages and construction of three big hydro-electric plants. The scheme aims at harnessing the power of the River Vienne and four smaller rivers in the departments of Haute Vienne and Creuse on the northernmost heights of the central plateau. One of the three power stations will be situated at Peyrat le Chateau, 20 miles east of Limoges, and another at Faux la Montagne, Creuse. The largest of the dams, to be built at Vassivieres on the Maulde River, will be 105 ft. high.—*Reuter.*

TRANSPORT

Aberdeen.—MODERNIZATION OF TRAMWAYS.—Mr. A. Smith, Corporation Transport manager, has recommended to the Town Council that the city's transport system be modernized at a cost of about £250,000. No support is given for trolley-buses in Mr. Smith's scheme, and he submits figures showing that if the tramcars were withdrawn and replaced by either trolley-buses or motor-buses operating costs would be increased.

Sunderland.—BUSES TO REPLACE TRAMS.—The Town Council has unanimously approved a recommendation of the Transport Committee to carry out no further extensions to the tram system (after the completion of the Durham road addition) and to adopt a policy of replacement with motor buses. Mr. C. A. Hopkins, manager of the undertaking, in a report on the subject, mentioned that the undertaking was free from debt and at the end of the last financial year had a reserve fund of over £100,000. He said he saw no reason at all for scrapping the trams, but if this was decided upon, he urged the use of motor-buses instead of trolley-buses. The cost of starting a motor-bus undertaking would be £714,000, including the price of 184 buses and road reinstatements at £60,000. The cost of a trolley-bus undertaking would be £880,000, including £770,000 for 154 buses at £5,000 each. The Council has decided that as soon as buses are available trams should be taken off the Villette Road, Circle and Southwick routes.

Earthing in Eire

IN an address delivered last week in Dublin before the Irish Branch of the Institution of Electrical Engineers Mr. R. W. RYDER dealt with some aspects of protective earthing. Special reference was made to the use of deep driven rods, their cost and test results in different soils obtained by Mr. Ryder in various parts of Eire.

An appeal was made " to those in authority " in that country to realize the urgency of the need for a more realistic approach to this subject, especially in view of the expansion which the industry was about to undergo in the next few years. Until the provision of efficient earthing was taken into consideration in every contract and there was a practical code for earthing which could be applied in every case, there must be a continual drift towards conditions bordering on the chaotic.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

Fluorescent Lamp Chokes

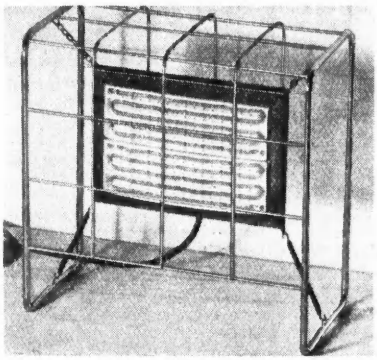
CONTROL chokes for 80-W fluorescent lamps are being made by SIMMONDS BROS., Bedcote Mill, Birmingham Street, Stourbridge, Worcs. Two models are available, either with a single output or tapped in four stages for voltage adjustment between 200 and 250 V. The interleaved winding on the steel core is impregnated for tropical climates and enclosed in a steel case which is compound filled and enamelled, of 5 lb weight. The dimensions are 2 by 6 and 7 in. long over the fixing lugs, the substantial terminal block provided being very accessible.

Household Heaters

The radiant fire named "Raylux" is now being distributed to the trade by HUME ATKINS & CO., LTD., 66, Victoria Street, London, S.W.1. It is 16·5 in. high and wide by 8·5 in. deep, and weighs 10·25 lb.

Spiral wire is wound in five rows in each of the two 1,000-W elements and anchored by nichrome clips in the grooves of the porcelain fire-bars. The top bar is connected directly to the input mains plug while the lower bar is controlled by a switch at the rear. The fire-bar frame is suspended within a metal rod "cage" by corner chains at the top and coiled springs at the bottom to minimize shock and vibration. The "cage" struts are welded in position and the whole is chromium plated.

A series of "Raylux" convectors, differently finished externally, all weigh 22 lb, and are

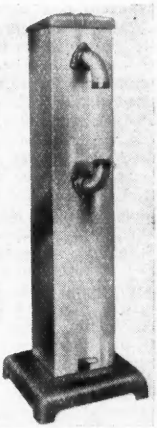


Suspended radiant fire

1 ft 11·25 in. high by 1 ft 6 in. wide by 6·25 in. deep. The loading is 2,000 W in three elements; the centre one is directly connected to the mains plug while the other two are separately controlled by a switch at each side. Porcelain is not used in their construction. Pilot lamps are fitted and thermostats can be provided at extra cost if desired.

Pedestal Hand Dryer

Hot-air hand dryers are now being made under the trade name of "Pyrobit" by the ACRU ELECTRIC TOOL MANUFACTURING CO., LTD., 123, Hyde Road, Ardwick, Manchester, 12. The stove-enamelled rectangular column is 4 ft 11 in. high by 18·5 in. wide and deep, the machine weighing 97 lb complete. Two motor-driven blowers direct air through heating elements,



Hot-air "Pyrobit" hand dryer

the two streams of hot air emerging through vertically opposed nozzles made of porcelain, which is non-conducting both thermally and electrically, so being cooler and safer than metal orifices. Control is by a foot pedal, projecting from the front of the base, which is spring loaded so as to switch off both blowers and heaters when foot pressure is released. Another switch automatically protects the elements against overheating in the event of the air flow ceasing or becoming obstructed. This dryer is designed to operate from a.c. mains only and is loaded to 2·5 kW, but a 1·25 kW model with a single outlet nozzle is also produced by the company.

Soldering Irons

The range of soldering irons for from 100 to 250 V manufactured by ELCO, LTD., Treforest Trading Estate, Pontypridd, Glam., South Wales, is sold through Elcordia, Ltd., 225, Westminster Bridge Road, London, S.E.1. They are available with replaceable elements and bits in five stock and special sizes from 150 to 350 W. The heavyweight type (2·25 lb) has a semi-hatchet head of die-cast aluminium. The "handy" model weighing 10 oz is obtainable with 60-, 80- and 100-W loadings. These irons are given a seven-days' continuous run before being marketed.

Electrical Installations

Draft Codes of Practice

THE Codes of Practice Committee has issued the following draft Codes for comment by February 24th:—3.6 " Electrical installations (General)," (3s. 6d. post free) and 3.63 " Choice, Installation and Maintenance of Electric Wiring System (for Power, Lighting or Heating Circuits) in Buildings," (2s. post free). These drafts have been prepared by a Committee (chairman, Mr. P. V. Hunter) convened by the Institution of Electrical Engineers as part of an electrical installations series.

Code 3.6 sets out the fundamental requirements of satisfactory installations. It refers to all relevant British Standard Specifications and includes recommendations for the design of circuits, switchgear, equipment and circuit protection and gives practical advice for work on site, including wiring and earthing. Sections on inspection, testing and maintenance and tabulated data on cable sizes and current ratings are also included.

Code 3.63 affords guidance on wiring systems for various classes of buildings. A distinction is made between installations provided during the construction of buildings, those in completed buildings and those involving additions or alterations to existing installations. Safety, cost, durability, appearance, facilities for altering existing installations, the limiting of interference with sound and television broadcasts, research and testing and maintenance are also fully dealt with. Copies may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1.

New " Ekco " Factory

BEFORE a distinguished and representative gathering at Rutherglen on January 16th, Mr. Tom Fraser, Under Secretary of State for Scotland, formally cut the first sod on the site of a new factory for E. K. Cole, Ltd.

A full range of the company's products was on display in the canteen of the present factory at Farme Cross, Rutherglen, including radio, television, car radio receivers and plastic mouldings. The Lighting Division was represented by tungsten and fluorescent lamps together with the newest " Ekco " fittings and control gear, and the Special Products Division by " Thermovent " heaters. Before the formal ceremony the guests assembled at the exhibition from which they were conducted over the present factory, and after the cutting of the first sod the directors and guests left for the Grosvenor Restaurant, Glasgow, for lunch.

Mr. Fraser proposed the health of E. K. Cole, Ltd., and Mr. E. K. Cole (chairman), in reply, said that the company was known mainly for its radio work, but its activities were divided into four main groups: radio, lighting, plastics and specialized forms of electric heating appliances. The Rutherglen factory had already played an important part in production for two of these groups viz. radio and lighting. They had achieved considerable development in the new industry of fluorescent lamps and lighting, with the associated fittings, accessories and control gear, and in this direction alone the Rutherglen factory should expand considerably.

Mr. N. C. Robertson, deputy managing director, in proposing a toast to Scottish industry, said that E. K. Cole, Ltd., was the first company to be engaged in the manufacture of fittings and control gear for fluorescent lighting in Scotland, as it had been the first to produce radio in Scotland.

Manufacture in Japan

THE reconstruction of electrical engineering works and factories in Japan made progress during last year and production capacity has therefore increased. Additions to output have been mainly in articles required by the Allied Forces and light mass-produced items. A report of the Supreme Command for the Allied Powers gives comparative figures for April and May. The principal items are as follows:—

Class of Goods	1946 April	1946 May
	Number	
Motors:		
Fractional h.p. ..	4,263	4,929
Standard stock :		
1–15 h.p...	8,284	6,906
16–100 h.p.	446	129
Other	1,200	750
Portable tools	1,500	1,600
Generators, convertor and m.g. sets except turbo-generators	583	535
Transformers:		
Distribution and power ..	3,659	2,531
Other	1,818	2,010
Control apparatus:		
Hand control	3,780	4,550
Remote control	1,765	1,805
Switchboard apparatus:		
For standard motors ..	500	520
3 300 V and over	250	240
Over 3,300 V	300	500
Meters..	31,830	28,003
Wiring supplies:	Kg	
Fuses	453,465	134,790
Railway line material ..	1,248	26,923
Line materials	316,000	127,000
	Number	
Other	807,900	748,097
Lighting bulbs:		
Inclu. 15–30 c.p.	2,687,000	3,581,000
Inclu. over 300 c.p. and special for railways and autos	150,500	187,700
Flashlights	485,000	587,000
	Tons	
Wire and cable	2,354	2,467
	Number	
Batteries:		
Flashlight	5,002,000	5,954,000
Automobile	35 700	22,900
Other	207,500	226,000

In addition small numbers of mercury vapour rectifiers, power condensers, furnaces and welding apparatus were turned out.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The India Rubber, Gutta Percha & Telegraph Works Co., Ltd., reports a net profit for the year ended September 30th last of £124,615, as compared with £107,861 for the preceding year. The dividend on the preferred ordinary shares is 6 per cent with an additional dividend of 2 per cent (same), and on the ordinary shares the fixed dividend of 6 per cent and an additional dividend of 3 per cent (same).

R. A. Lister & Co., Ltd.—A preliminary statement gives the net profit for the year ended September 30th last as £175,889, compared with £137,077 for 1944-45. The final dividend is being maintained at 5 per cent, but the bonus is raised from 6 to 8 per cent, making a total distribution for the year of 18 per cent (against 16 per cent). The 300,000 new ordinary shares created last May rank for half of the final dividend and bonus.

The Traction & General Investment Trust, Ltd., reports a net revenue, subject to audit, of £37,157 (against £33,939) and it is proposed to pay a final dividend of 5½ per cent, making 7½ per cent for the year (against 7 per cent).

The British Columbia Telephone Co. is applying to the Federal Parliament for permission to increase its capital from $11 million to $25 million in connection with the financing of a five-year expansion programme.

The General Gas & Electricity Co., Ltd., has declared an interim ordinary dividend of 10 per cent (against nil).

Bennis Combustion, Ltd., is paying an interim dividend of 5 per cent (same).

New Companies

Aberdare Cables of South Africa, Ltd.—Capital, £400,000. Registered in South Africa in August, 1946, to carry on the business of manufacturers of, and dealers in, electric and other cables and wires, etc. British address: 53, New Broad Street, E.C.2. Directors: Sir George C. Usher (chairman of Aberdare Cables, Ltd.), F. G. Penny (managing director of Aberdare Cables, Ltd.), W. T. B. Cox, W. J. Cotterell, J. F. Hathorn and R. J. Bates.

International Aeradio, Ltd.—Registered January 9th as a public company. Capital, £250,000. To send and receive signals, messages and communications to and from aircraft, dirigibles and all other vehicles propelled in the air, to improve and prosecute the art and business of electrical communication and to radiate, receive and utilize electro-magnetic waves, etc. Directors: Major J. R. McCrindle and Sir Victor H. Tait (British Overseas Airways Corporation), W. W. Straight and D. Saward (British European Airways Corporation), Group Capt. P. D. de Lazlo and A. G. Store (British South American Airways Corporation). Seven directors are to be appointed by holders of group "A" shares and two by holders of group "B" shares. Regd. office: Stratton House, Stratton Street, W.1.

Simplex-Ampro, Ltd. — Registered January 15th. Capital, £2,500. Agents for manufacturers of, and dealers in electrical machinery, including motion picture projection equipment, radio and radar instruments, etc. Subscribers: N. E. Fraser and D. H. Zimmer. Three of the first directors are to be appointed by the General Precision Equipment Corporation and two by Kelvin, Bottomley & Baird, Ltd., and Henry Hughes & Sons, Ltd., jointly. Solicitors: Linklaters & Paines, Granite House, Cannon Street, E.C.4.

Conrad Electrical Co., Ltd. — Registered January 15th. Capital, £30,000. To acquire the business of the Conrad Electrical Co. and the Conrad Plastics Co., carried on by R. H. Creasey at Dicker Mill, Hertford; and to carry on the business of radio, electrical, plastic manufacturers and dealers, etc. Directors: R. H. Creasey, J. G. Williams, H. S. Fox and M. Banus. Regd. office: Royal London House, 17, Finsbury Square, E.C.2.

Downes & Davies, Ltd.—Registered January 10th. Capital, £60,000. To acquire the business of manufacturers, workers and wholesale dealers in electrical equipment and components of all kinds carried on by P. L. Davies and T. Woods at 1-9, Stanley Street, Liverpool, as Downes & Davies. Directors: P. L. Davies, and T. Woods. Secretary: A. Ellison. Regd. office: 1-9, Stanley Street, Liverpool.

Broadcast Relay Service (Overseas), Ltd.—Registered January 11th. Capital, £600,000. To own and operate wireless signal and television stations, etc. Subscribers: Cynthia J. Pettman and W. H. Craig. Solicitors: Sydney Morse & Co., Alder House, 1/6, Aldersgate Street, E.C.1.

Electric Installation Co. (Wimbledon), Ltd.—Registered January 11th. Capital, £6,000. To acquire the business of Electric Installation Co. carried on by Louise Chapman and K. M. Chapman at 17, The Broadway, Wimbledon, Surrey. Permanent directors: Louise Chapman and K. M. Chapman. Regd. office: 17, The Broadway, Wimbledon.

N. Marshall, Ltd.—Registered January 14th. Capital, £3,000. To acquire the business of a cinematograph, electrical, radio and general engineer now carried on by Claude Marshall at 1, Moorgate Street, Nottingham, as "N.

Marshall." C. Marshall is first and permanent director. Regd. office: 21, Moorgate Street, Nottingham.

Williams Brothers (Electrical), Ltd.—Registered January 6th. Capital, £1,500. To acquire the business of Williams Brothers, electrical engineers and contractors, 33, Stafford Road, Wolverhampton. Directors: F. Williams, Phyllis M. Williams and Henry Kronheim. Regd. office: 33, Stafford Road, Wolverhampton.

Burrough Electrical Co., Ltd.—Registered January 8th. Capital, £1,000. To acquire the business of an electrical engineer carried on by F. C. Burrough at 536, Chester Road, Old Trafford, Lancs, as Burrough Electric Co. Directors: F. C. Burrough and Mrs. Margaret Burrough. Regd. office: 536, Chester Road, Old Trafford, Manchester.

G. G. Walkden, Ltd.—Registered January 14th. Capital, £500. Electrical engineers and general electrical installation contractors, etc. Directors: M. Simons (permanent managing director), and G. G. Walkden. Regd. office: 113, Victoria Street, St. Albans, Herts.

Thorne Howell, Ltd.—Registered January 10th. Capital, £500. Manufacturers and repairers of, and dealers in, dynamos, motors, armatures, magnetos, batteries, etc. Directors: W. F. Howell and R. N. Thorne. Secretary: Kathleen G. Howell. Regd. office: 556, Garratt Lane, Earlsfield, S.W.18.

Timlec Sales (London), Ltd. — Registered January 8th. Capital, £250. Dealers in electric and other clocks, scientific instruments, etc. Directors: Z. C. Jaffe and J. Jaffe. Regd. office: 24, Market Place, Rugby.

S. White (Streatham), Ltd. — Registered January 8th. Capital, £1,000. Contractors for electrical installations of all kinds, etc. Directors: S. White and Jessie F. White. Regd. office: 109, Mitcham Lane, Streatham, S.W.16.

Electengs, Ltd.—Registered January 13th. Capital, £2,000. Electrical engineers, etc. Directors: D. V. Jones, A. E. Walters, F. J. R. Harding and R. S. Lusty. Regd. office: 1, Queensbury Circle, Kenton, Harrow.

Increases of Capital

Small Electric Motors, Ltd.—Capital increased by £50,000 beyond the registered capital of £20,000. At June 6th, 1946, 10,000 redeemable cumulative preference, 4,955 cumulative preference and 2,295 ordinary shares of £1 each had been issued, of which Broadcast Relay Service, Ltd., held 10,000 redeemable cumulative preference, 4,953 cumulative preference and 1,593 ordinary.

J. W. Gladwin & Sons, Ltd.—Increased by £2,400 beyond the registered capital of £600.

Cape Electric Tramways, Ltd.—Increased by £100,000 beyond the registered capital of £500,000.

N.E.P., Ltd.—Increased by £9,900 beyond the registered capital of £100.

Marbla Refrigeration, Ltd.—Increased by £1,000 beyond the registered capital of £1,000.

Artie Insulation, Ltd.—Increased by £1,000 beyond the registered capital of £500.

Private Arrangement

J. V. Barke, electrical engineer, trading as John V. Barke, 79, Foregate Street, Chester, 26 and 27, Union Hall Buildings, Foregate Street, Chester, and 290, High Street, Connah's Quay.—At a recent meeting of creditors a statement of affairs was presented by Mr. Parkin S. Booth, accountant, of 5, Rumford Place, Chapel Street, Liverpool, which showed liabilities of £4,066 and net assets of £4,759, leaving a surplus of £693. It was decided that a deed of assignment should be executed to Mr. Booth and a committee of inspection appointed so that pending full exploration of the possibilities of arranging additional capital, or the sale of the business, the assets would be protected.

Bankruptcies

A. S. Britton, 9, Moorside Road, Heaton Moor, Stockport, and 123, Higher Hillgate, Stockport, radio engineer and electrical contractor.—The receiving order was made on a creditor's petition and according to the statement of affairs filed there are liabilities amounting to £1,575 against assets of £942, leaving a deficiency of £633. Mr. A. T. Eaves, of H. L. Price & Co., incorporated accountants, 47, Mosley Street, Manchester, has been appointed trustee of the estate.

R. L. Newell, trading as R. & R. Newell, High Bank Mill, Egremont, Cumberland, electrical engineer.—First meeting held January 21st. Public examination January 31st at the Court House, Sandhills Lane, Whitehaven.

W. H. Grange, carrying on business as the Talbot Electrical Co., at 14, Plumstead Road, Thorpe St. Andrew, Norfolk, electrical engineer. —Further supplemental dividend of 4¼d. in the £, payable January 17th at the Official Receiver's Office, Castle Chambers, Opie Street, Norwich.

L. E. Holland, trading at 4, St. James's Churchyard, Haymarket, and formerly at 67, Ashgrove Road, Horfield, both in Bristol, and now residing at "Terra Cotta," West Kington, Wilts, electrician.—Order made September 20th, 1946, suspending bankrupt's discharge for twelve months until September 20th, 1947.

Liquidations

Electrical Credit Services, Ltd.—Winding up voluntarily. Liquidator, Mr. F. Neal, Abbey House, Baker Street, London, N.W. 1.

Isle of Arran Electric Light & Power Co., Ltd.—Winding up voluntarily. Liquidator, Mr. J. R. Turnbull, Bank Buildings, 16, St. James's Street, London, S.W.1.

MOTORS
GENERATORS

CONTROL GEAR
AIR BREAK
OIL IMMERSED
HAND OPERATED
AUTOMATIC

SWITCHGEAR
SWITCHES
FUSES
SWITCHBOARDS
AIR BREAK
OIL IMMERSED

FANS
CEILING
DESK and
BRACKET
VENTILATING

LIGHTING FITTINGS
GAS FILLED
DISCHARGE

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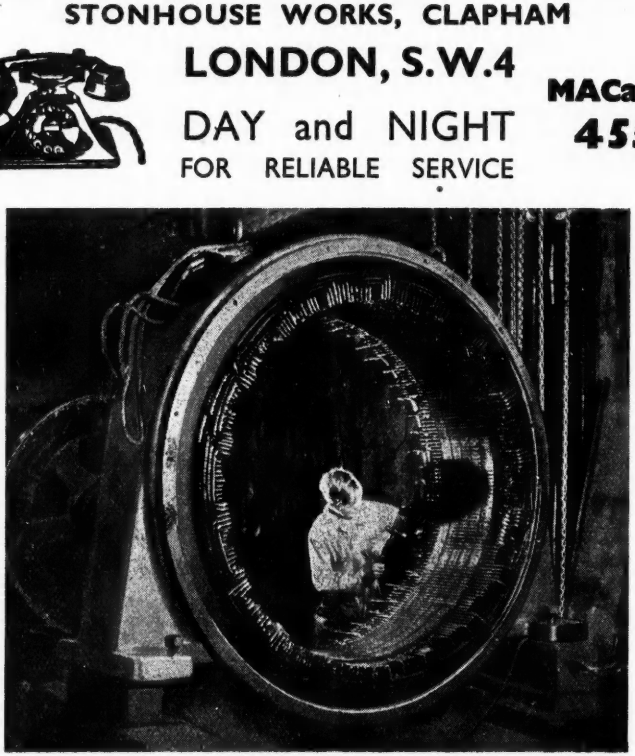

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STOCKS AND SHARES

STOCK Exchange markets are very busy. It is probable that no such activity has been seen in the House since a year or two before the war. The various factors causing this state of affairs have been mentioned here from time to time. Chief amongst them is the cheap money policy of the Government, the repayment at 100 of Local Loans and the redemption of a number of other gilt-edged securities. Besides these, there is the nationalization policy that has induced many people to sell Home Railway stocks, electricity supply, and colliery shares, with the intention to reinvest into something else which will return a better yield than that derivable from the "compensation" stocks. As a direct consequence, prices have been rising hand over fist, as they say, and few departments have been overlooked.

"Compensation" Policy

In deciding that market prices shall be the basis for compensating electricity stockholders, the Electricity Bill has revived in aggravated form the objections previously raised over the application of the same method to the Home Railway companies. As a general principle, high authorities have pointed out, market prices do not necessarily represent at all closely the underlying value of the assets and earning power. Particularly is this the case where nationalization uncertainties have themselves been responsible for the undue depression of the prices concerned. In detail, the policy leads to endless inequalities, giving little or no credit for profits ploughed back for the benefit of the future earning capacity at the expense of current dividends, and rewarding the less thrifty undertakings. Prices to be taken for compensation purposes are to be based on average quotations ruling either in the first week of last November, or during the pre-Election period at certain dates between February and July, 1945.

Take-over Prices

In the following table, a comparison is made, in the case of some of the leading ordinary shares, between current market prices and those estimated for compensation purposes, taking the better of the optional periods:—

Ordinary share	Compensation price	Present price
	s. d.	s. d.
Bournemouth & Poole ..	66 8	64 0
Brit. Power & Light ..	37 10	36 0
City of London	34 4	32 6
Clyde Valley	46 5	44 0
County of London	49 5	47 6
Edmundsons	31 6	30 0
Lancs Elec.	37 7	35 6
London Elec.	31 4	29 0
Midland Counties	51 5	49 0
Scottish Power	46 1	45 0
Yorkshire Elec.	50 10	48 6

Here is a similar comparison between preference share prices:—

Preference	Compensation Price	Present Price
	s. d.	s. d.
British Power & Light 6 per cent.	29 10	28 6
Clyde Valley 8 per cent. ..	41 0	39 0
County of London 4 per cent.	23 9	22 0
Edmundsons 7 per cent ..	36 1	34 0
Midland Counties 6 per cent.	31 6	30 0
Scottish Power 6 per cent.	31 4	29 6

It will be seen that to-day's quotations, without exception, stand below the prices to be paid in compensation.

Price Changes

On balance, electricity supply shares stand lower than they did a week ago. Newcastles at 31s. 6d. and Northamptons at 48s. 9d. are noticeable with losses of half-a-crown each. South Londons are 1s. 6d. down at 31s. 6d. and others which have lost ground include Midland Counties at 49s. and City of Londons at 32s. 6d. Holding companies' shares on the other hand, were inclined to improve, Edmundsons and British Power & Light both showing small gains at 30s. and 36s. respectively.

Cable makers' shares provided the best feature in the electrical equipment market. B.I.C. led the way with a rise of 3s. 3d. to 52s.; Enfields strengthened to 54s. 6d. and Henley's to 30s. Telegraph Construction at 61s. 6d. and Tube Investments at 7½ have again moved up, and a jump of 20s. left De la Rue at £15. Metal Industries "B" at 66s. 3d. have gained 3s. 9d., and Murex the same amount to 5 1/16. Switchgear & Cowans advanced 1s. 6d. to 27s. In the radio group, Deccas at 58s. and E. K. Coles at 32s. 6d. are 1/16 lower; E.M.I. rose 6d. to 29s.

Indian Shares Advance

Calcutta Electric Supply ordinary put on 8s. in response to a report, emanating from Calcutta, that the Government of Bengal will exercise its option to buy the company in three years' time. Side by side with this came a report that Bengal might also buy the Calcutta Tramways undertaking, and the price of the shares rose 2s. 6d. to 3½. Victoria Falls ordinary have advanced to £6. Tokyo Electric 6 per cents are higher at 52. A florin rise lifted Palestine Electric "A" to 38s. 6d.

Cable & Wireless

Cable & Wireless ordinary touched 156 (a rise of 38 points in a month) before reacting a trifle. Side by side with the rise in the ordinary stock, Cable & Wireless 5½ per cent preference showed a tendency to decline. The price went back to 118½. Apparently there are some people who regard with considerable caution the outlook for the preference stock in the event of the Combine's going into voluntary liquidation.

Forthcoming Events

Monday, January 27th.—LONDON.—Institution of Electrical Engineers, 5.30 p.m. Informal meeting. Discussion on "National Certificates and their Relation to the Needs of Industry," to be opened by S. E. Goodall.

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 4 p.m. I.E.E. South Midland Centre (Radio Group). Chairman's address by J. Aspin.

BRISTOL.—University, 6 p.m. I.E.E. Western Centre (Installations Group). "Electrical Control of Dangerous Machinery and Processes," by W. Fordham Cooper.

NEWCASTLE-ON-TYNE.—Neville Hall, Westgate Road, 6.15 p.m. I.E.E. North-Eastern Centre. "Lighting Surges on Transmission Lines in Ireland," by R. C. Cuffe.

SHEFFIELD.—Metallurgical Club, West Street, 7 p.m. Junior Institution of Engineers (Sheffield Section). "Light and Colour," by L. H. A. Carr.

NOTTINGHAM. — Corporation Gas Showrooms, 6.30 p.m. Joint meeting of Nottingham Society of Engineers and the Association of Mining Electrical and Mechanical Engineers (Midland Branch). "The Mechanical Layout of a Modern Colliery," by A. E. Naylor.

Tuesday, January 28th.—LONDON.—I.E.E. London Students' Section, 7 p.m. "The Principles of Manual and Automatic Telephone Exchanges," by P. H. J. Johnson.

At the Royal Society of Tropical Medicine and Hygiene, Portland Place, W.1, 7 p.m. Society of Instrument Technology. "Some Applications of Electronics in the Iron and Steel Industry," by W. C. Fahie.

At the Royal Society, 5.30 p.m. Institute of Physics (Electronics Group). "Semi-Conductors," by Prof. H. S. W. Massey.

LEEDS.—Corporation Electricity Department, Whitehall Road, 6 p.m. I.E.E. North Midland Centre (Installations Group). "Engineering Principles applied to the Design of Domestic Water-heating Installations of the Solid-Fuel/Electric Type," by R. Grierson and Forbes Jackson.

LOUGHBOROUGH. — The College, 6.30 p.m. I.E.E. East Midland Centre. "Technical Education," by H. L. Haslegrave.

COVENTRY.—Coventry Electric Club. "Oils," by R. Gledhill.

Wednesday, January 29th.—LONDON.—I.E.E. London Students' Section, 2.30 p.m. Visit to Johnson, Matthey & Co., Ltd., Hatton Garden.

At the Institution of Civil Engineers, Great George Street, S.W.1, 6 p.m. Institute of Welding. Discussion on "Future Ships—Will They be All-Welded?"

EDINBURGH.—Heriot-Watt College, 6 p.m. I.E.E. Scottish Centre. "The Analysis of Vibration Problems," by A. J. King.

Thursday, January 30th.—LONDON.—Institution of Electrical Engineers, 5.30 p.m. "The Teaching of the Principles of Electrical Machine Design," by L. H. A. Carr.

E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, W.C.2, 7 p.m. Electrical Power Engineers' Association (London Technical Group). "High Rupturing Capacity Fuses," by G. S. Lane.

Connaught Rooms, W.C.2, 12.55 p.m. Batti-Wallahs' Society. Luncheon. Address by H. Quigley.

MANCHESTER.—Women's Engineering Society (Manchester Branch). Visit to the all-electric Levenshulme Laundry.

Friday, January 31st.—LONDON.—Lighting Service Bureau, W.C.2, 6 p.m. Royal Statistical Society (Industrial Applications Section). "Control Charts applied to Sales Data," Dr. B. P. Dudding.

Saturday, February 1st.—CARDIFF.—Grand Hotel, 6 p.m. Association of Mining Electrical and Mechanical Engineers (South Wales Branch). Annual dinner.

Monday, February 3rd.—NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Centre (Radio and Measurements Group). "A Method of Transmitting Sound in the Vision Carrier of a Television System," by D. I. Lawson, A. V. Lord and S. R. Kharbanda.

BIRMINGHAM.—James Watt Institute, 6 p.m. I.E.E. South Midland Centre. Paper on "Domestic Water Heating Installations," by R. Grierson and Forbes Jackson.

BRADFORD.—Technical College, 7.15 p.m. Bradford Engineering Society. "Air Conditioning," by F. C. Frean.

SUNDERLAND.—Technical College, 4 p.m. Institute of Marine Engineers (Junior Section). "Combustion Turbines," by J. Calderwood.

Tuesday, February 4th. — LONDON. — Oddfellows' Hall, 186, Hammersmith Road, S.W., 7 p.m. Association of Supervising Electrical Engineers (West London Branch). "Mineral-Insulated Sheathed Cables," by G. E. D. Redman.

GLASGOW. — Ca'doro Restaurant, Union Street, 7.30 p.m. Electrical Society of Glasgow. 'Electrical Repairs," by R. M. Callender.

I.E.E. Annual Dinner

THE annual dinner and reunion of the Institution of Electrical Engineers will be held at the Connaught Rooms, Great Queen Street, London, W.C.2, on February 27th. Applications for tickets (£1 each, exclusive of wines) should be made to the Secretary of the Institution, not later than February 3rd. Members may apply for a ticket for one personal guest but he must be a member of the Institution.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

ACE Electronics, Ltd., L. C. Welch and R. J. Cook.—" Electrical measuring instruments of the bridge type." 17117. September 7th, 1944. (583981.)

Akt.-Ges. Brown, Boveri & Cie.—" Gas-blast electric circuit-breakers." 18604/44. September 2nd, 1943. (584002.)

N. J. Austin.—" Application of identification or other markings to electric cables." 20146. October 18th, 1944. (584028.)

Autophon Akt.-Ges.—" Loudspeaking intercommunicating telephones." 16503/44. November 3rd, 1943. (583975.)

A. Barnett.—" Electrical chokes." 21789 November 7th, 1944. (584043.)

T. F. P. Bell.—" Electrically-heated kettles, tea-pots, and the like." 19314. October 9th, 1944. (583828.)

O. Bevir, H. E. Morse, C. S. Wright and H. J. A. Lynch.—" Electric motor control systems." 20320. December 6th, 1943. (583861.)

Chloride Electrical Storage Co., Ltd., and R. Gray.—" Non-spill arrangements for electric accumulators." 23421. September 11th, 1945. (583884.)

Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz.—" Electric protecting devices for networks." 16300/41. December 31st, 1940. (583840.)

E. I. Du Pont de Nemours & Co.—" Enamels for electrical resistors." 23795/44. November 29th, 1943. (584053.)

English Electric Co., Ltd., and J. P. Chittenden.—" Heat engine power plant including turbines." 14931. October 23rd, 1942. (583843.)

English Electric Co., Ltd., and R. L. English.—" Control of electric arcs." 9479. May 17th, 1944 (584007.)

English Electric Co., Ltd., P. L. Mardis and F. Wilson.—" Brake operating means." 4009. March 4th, 1940. (583837.)

Ericsson Telephones, Ltd., and D. C. Crowe.—" Indicators for displaying variable information." 16012. August 22nd, 1944 (583971.)

G. E. F. Fertel and C. S. Wright.—" Transmission of electro-magnetic waves by means of wave guides." 10957. June 7th, 1944. (583951.)

G. H. Fletcher and Metropolitan-Vickers Electrical Co., Ltd.—" Vehicle lighting systems." 12407. June 29th, 1944. (583825.)

J. Frank.—" Portable electric flash lamps." 17666. October 26th, 1943. (583854.)

General Electric Co., Ltd., and E. Friedlander.—" Means for exciting alternators." 3447. March 16th, 1942. (583887.)

General Electric Co., Ltd., and E. Gallizia.—" Electric ignition devices for use in vapour electric arc convertors." 7184. June 6th, 1941. (583946.)

General Electric Co., Ltd., F. H. Brittain and C. E. Ransley.—" Point-contact rectifiers." 18563. November 8th, 1943. (583855.)

General Electric Co., Ltd., V. J. Francis and E. Kettlewell.—" Sealed envelopes of quartz or like material." 14770. November 17th, 1941. (Addition to 534310.) (583886.)

E. R. Goldfield.—" Cable end construction." 2092. February 4th, 1944. (583864.)

H. H. Gordon (Allmanna Svenska Elektriska Aktiebolaget).—" Arrangement in compressed-air-blast electric circuit-breakers." 5129. March 20th, 1944. (Convention date not granted.) (583896.)

Hazeltine Corporation.—" Mounting device for an electrical circuit element." 12573/44. September 15th, 1943. (583954.)

A. O. Hinchliff and Watliff Co., Ltd.—" Commutators for electric motors or other dynamo-electric machines." 8909. May 10th, 1944. (584006.)

H. Hughes & Son, Ltd., D. O. Sproule and A. J. Hughes.—" Electrical connecting means." 15842. August 18th, 1944. (583869.)

Igranic Electric Co., Ltd.—" Control systems for polyphase alternating current electric motors." 5279/44. April 8th, 1943. (583820.)

P. M. Luckham and J. E. Medgett.—" Apparatus for operating valves electro-magnetically particularly applicable to valves of internal-combustion engines." 16878. September 4th, 1944. (583977.)

E. F. McDonald, Jun.—" Radio or like signal reproducers." 12613. July 3rd, 1944. (584014.)

Magnavox Co.—" Electric impulse generator." 10451/44. January 21st, 1944. (583915.)

Marconi's Wireless Telegraph Co., Ltd., and S. W. H. W. Falloon.—" Navigation aiding radio systems." 27307. October 5th, 1939. (583787.)

Marconi's Wireless Telegraph Co., Ltd., and H. J. Round.—" Beam forming apparatus for, for example, sound energy." 11152. September 1st, 1941. (583790.)

A. H. Midgley, A. M. Midgley and F. Midgley.—" Interference elimination in electric signalling systems." 7424. June 1st, 1942. (583791.)

Morris Motors, Ltd., J. H. Bridle, and R. J. Brown.—" High-frequency electrical heating apparatus." 4773. February 26th, 1945. (583833.)

J. F. O'Brien.—" Conductor unit for electric wiring systems." 13623/44. July 10th, 1943. (583935.)

Omes, Ltd., and G. Mora.—" Electrical heating of workpieces." 8577. May 5th, 1944. (583905.)

R. F. Oxley.—" Variable electrical condensers." 20725. October 25th, 1944. (584031.)

G. F. W. Powell and Molins Machine Co., Ltd.—" Dynamic braking arrangements for direct-current motors." 17635. September 14th, 1944. (583993.)

Radio Corporation of America.—" Ultra-high-frequency ignition system primarily for internal-combustion engines." 7101/43. May 29th, 1942. (583802.)

S. Raybould.—" Switching means for use in electricity distributing systems." 15941. August 21st, 1944. (583970.)

J. H. Runbaken.—" Electric soldering irons." 17053. September 6th, 1944. (583980.)

A. H. Secord, and G. R. Lang.—" Valve voltmeter." 25026. December 13th, 1944. (584059.)

Siemens Bros. & Co., Ltd., and D. P. Long.—" Telephone systems." 13183. May 25th, 1945. (583834.)

M. Slaffer and C. S. Wright.—" Wireless receiving systems." 18083. December 10th, 1942. (583800.)

P. A. Sporing, C. P. Johnson and Telegraph Condenser Co., Ltd.—" Electrical condensers." 17779. September 18th, 1944. (583997.)

Standard Oil Co. of California.—" Electromagnetic pick-up unit for determining the intensity of engine detonation." 17725/44. October 23rd, 1943. (583995.)

Standard Telephones & Cables, Ltd.—" Means for testing cables." 18025/44. September 23rd, 1943. (583999.) " Modulation circuits and application thereof to radio beacons." 22163/44. November 15th, 1943. (584046.)

Standard Telephones & Cables, Ltd., and C. W. Earp.—" Arrangements for frequency measurement." 9658. July 10th, 1942. (583794.) " Electrical multivibrator circuits." 17729. September 15th, 1944. (583996.)

Standard Telephones & Cables, Ltd., and G. Gilliver.—" Terminal arrangements for electric resistances." 20052. October 17th, 1944. (584027.)

Standard Telephones & Cables, Ltd., and A. S. Wade.—" Electron discharge devices." 23379. November 23rd, 1944. (584051.)

Standard Telephones & Cables, Ltd., and E. O. Willoughby.—" Electric impedance networks." 7481. April 21st, 1944. (583873.)

Standard Telephones & Cables, Ltd., P. K. Chatterjea and C. T. Scully.—" Pulse modulated transmission systems." 11098. August 7th, 1942. (583799.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Pulse modulation systems." 2772. February 15th, 1944. (583894.)

A. Tustin and Metropolitan-Vickers Electrical Co., Ltd.—" Follow-up control systems." Cognate applications 2503/39 and 17764/39. January 24th, 1939. (583835.) " Electric follow-up control systems." Cognate applications 16634/39, 17765/39, and 19012/39. June 6th, 1939. (583836.) " Control systems for power-driven objects." 15314. November 27th, 1941. (583838.)

A. Tustin, D. W. Wells and Metropolitan-Vickers Electrical Co., Ltd.—" Control systems for power-driven objects." 15479. December 1st, 1941. (583839.)

C. L. Warburton, W. F. Smith, F. H. Wilshaw, Metropolitan-Vickers Electrical Co., Ltd., and W. Crosland, Ltd.—" Press tools for the cutting of articles out of sheet metal or plywood." 10686. June 2nd, 1944. (583949.)

R. I. N. Weingart.—" Transmission system in movements for measuring instruments." 7509/44. April 24th, 1943. (583901.)

A. West & Co., Ltd., and F. J. Pavitt.—" Electromagnetic switches and relays." 23028. November 20th, 1944. (584050.)

Westinghouse Brake & Signal Co., Ltd. (Westinghouse Air Brake Co.).—" Hydraulic accumulators." 19974. November 30th, 1943. (583858.)

Westinghouse Electric International Co.—" Electrical induction apparatus." 13483/44. July 20th, 1943. (583957.)

G. F. Wittgenstein.—" Installation of telecontrol in particular for broadcasting by telephone lines with multiple programmes." 11377. July 13th, 1943. (Convention date not granted.) (583808.)

C. L. Wood.—" Welding electrode holders." 340. January 7th, 1944. (583891.)

Amended Specification

525592. G. H. Scholes & Co., Ltd., and others.—" Electric switches for alternating current circuits."

Rubber Production and Consumption

THE upward movement in the production of natural rubber continues. In October last, according to the December *Rubber Statistical Bulletin*, the estimated output of the principal territories was 100,000 tons, against 95,000 tons in September. Production for the first ten months of last year thus amounted to 622,500 tons, comparing with a total of 240,000 tons for the whole of 1945. At the same time the output of synthetic rubber slowly continued to fall: the total for the first nine months of 1946 was 604,093 tons against 866,069 tons for 1945. The principal world stocks of natural rubber at the end of October are estimated at 825,000 tons, against 600,000 tons at the end of 1945. Synthetic rubber stocks are put at 67,500 tons against 845,000 tons at the end of 1945.

The analysis of consumption in the United Kingdom shows that in October the cable industry used 804 tons of natural rubber and 81 tons of synthetic, a total of 885 tons.

The *Bulletin* is obtainable from W. H. Smith & Son's branches at 2s.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—VICTORIA.—April 23rd. State Electricity Commission. Transformers and spares for 264/240-kV and 220/200-kV circuits. (Spec. 46-47/79.)

TASMANIA.—February 2nd. Hobart City Council. Twelve trolley-bus chassis or alternatively complete vehicles.—*Tenders* (Melbourne).

Birkenhead.—February 17th. Electricity Department. Twelve months' supply of electric lamps. (See this issue.)

Birmingham.—January 31st. Electric Supply Department. Electric motors and starters. (January 17th.)

Bury.—January 31st. Electricity Department. Two 1,500-kVA, 6,500/400/230-V, three-phase transformers. (January 17th.)

Cardiff.—January 29th. Rural District Council. Electric lighting and heating circuits in ten existing Council houses at Taff Terrace. H. Jackson, electrical engineer, 20, Park Place.

Cheadle and Gatley.—February 10th. Electricity Department. Materials for twelve months ending March 31st, 1948. (See this issue.)

Dumfries.—January 28th. Electricity Department. 3,300/415-V transformers. (January 17th.)

Great Yarmouth.—January 31st. Electricity Department. Transforming plant and apparatus for South Denes power station. (January 10th.)

Hertford.—February 17th. Colne Valley Sewerage Board. Provision and laying of cable, fixing of distribution switch- and fuse-gear, lighting fittings, lamps and lamp columns. (See this issue.)

Ilkeston.—February 10th. Borough Council. Electrically operated booster pumping equipment at two stations. A. O. Marshall, water engineer, Town Hall.

Irthlingborough.—February 1st. Urban District Council. Electrical water boosting plant, comprising duplicate centrifugal pumps, motors, automatic starters, etc. E. Turnbull, surveyor, Council Offices, Station Road.

Manchester.—February 10th. Waterworks Committee. Five electrically driven pumps together with main switch and motor starting gear, etc. (January 10th.)

New Zealand.—February 11th. Hydro-Electric Department. 110- and 33-kV outdoor switchgear and steelwork, and four 33-kV, 750-MVA circuit breakers.

Oldham.—February 3rd. Town Council. Electrically driven submersible pumping unit (capacity 700 gallons per minute), complete with time operated switchgear. C. Busfield, waterworks engineer, Greaves Street.

Plympton St. Mary.—February 14th. R.D.C. Electricity Undertaking. Overhead line materials, street lighting equipment, e.h.v. switchgear, house wiring materials and tools. (January 17th.)

Portsmouth.—February 12th. Electricity Department. Two 230-V, 200-Ah, stationary lead-acid accumulator batteries each fitted with charging equipment. (January 10th.)

Delivery and erection of distribution system diagram, generating station works auxiliaries, control and indication diagram, and automatic telephone equipment. (See this issue.)

Richmond (Yorks).—February 10th. Corporation. Supply and laying of 1,100 yd of cable. (See this issue.)

Southend-on-Sea.—March 13th. Corporation. Rolling stock for the pier electric railway. (January 17th.)

Southwark.—January 30th. Electricity Department. Wiring of domestic premises. (January 17th.)

Tottenham.—February 7th. Borough Council. Electric lamps (Schedule No. 20). F. Hill, acting town clerk, Town Hall, N.15.

York.—February 10th. City Council. Five electrically operated inverted spindle pumps, with motor and automatic switchgear (Contract No. 3); and two sets of electrically operated disintegrators, with motor and switchgear (Contract No. 5). C. J. Minter, city engineer, Guildhall.

Orders Placed

Ashton-under-Lyne.—Electricity Committee. Accepted. One 500-kVA transformer.—Brush Elec. Engineering Co. Four-panel truck type switchboard.—Ferguson, Pailin. Twelve-way unit type l.v. distribution board.—W. Lucy & Co.

Bedford.—Electricity Committee. Accepted. Heating installation at switch-house (£607).—G. N. Haden & Son, Ltd.

Bradford.—Education Committee. Accepted. Electrical installations at schools:—Princeville Modern (£620).—Bancroft & Tordoff. Princeville Infants' and Nursery (£348).—J. Carter & Sons (Bradford). Ryan Street (£1,045).—J. Carter & Sons (Bradford).

Cardiff.—Electricity Committee. Accepted. Switchgear (£6,127).—South Wales Switchgear. Seven 1,000-kVA transformers (£4,914).—Bryce Electric Construction.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Arbroath.—Houses (218); secretary, Scottish Special Housing Association, Ltd., Edinburgh.

Armitage (Rugeley).—Works additions, for E. Johns & Co., Ltd.; T. Lowe & Sons, Ltd., builders, Curzon Street, Stoke-on-Trent.

Banbury.—Extensions and developments at Horton General Hospital, including out-patients' block, maternity block, nurses' house and twin operating rooms, for Board of Management; secretary to Board of Management.

Barnsley.—Junior school, Athersley (£75,265), and new schools at Kendray and Hunningley Lane; borough surveyor.

Blackpool.—Factory, Collins Avenue; Blackpool Cast Stone Co., Ltd.

Factory, Mowbray Drive; Jason Tools, Ltd.

Bootle.—Permanent houses (62), Orrell Mount site; borough engineer, Town Hall.

Bournemouth.—Reinstatement Winter Gardens (£12,395).—J. Drewitt & Son.

Bradford.—Houses (464), Eccleshill and Clayton; city architect, Town Hall.

Cardiff. — Reconstruction Moorland Road school (£31,200); city engineer.

Factory.—Collington Road; Lionite Specialities, Ltd.

Coventry.—R.C. Church, Lime Tree Park, Whoberley; Rev. Fr. Hampton, P.P., Church of All Souls.

Droitwich.—Permanent houses (40), St.Peter's Crescent; borough engineer, Friar Street.

Dudley.—Primary school, Yew Tree estate; borough architect.

Dumbarton.—Houses (500); Melville, Dundas & Whitson, Ltd., building contractors, 21, Blythswood Square, Glasgow.

Elgin. — Permanent houses (86), Seafield Lands; burgh surveyor, South Street.

Essex.—Nine schools (£865,600); county architect, Chelmsford.

Gipping.—Houses (20), Bramford; R. H. K. Wickham, clerk to R.D.C., Council Offices, Needham Market, near Ipswich.

Glasgow.—Students' hostel and laboratory for agricultural science for Glasgow University Court; Master of Works, The University.

Factory, Govan; British Polar Engines, Ltd., Helen Street, Govan.

Gosport.—Houses (250), Bridgemary; borough surveyor, Town Hall.

Hastings. — Secondary school for girls (£54,000); borough engineer.

Haverfordwest.—Houses (124); R.D.C. surveyor, Dew Street.

Heywood.—Central bus station; A. Middleton, borough surveyor, Municipal Buildings.

Highbridge.—Factory for Clark, Son & Morland, Ltd., Glastonbury.

Hindley (Lancs).—Factory, Hindley Green, for Turner & Newall, Ltd.; J. Gerrard & Sons, Ltd., builders, Swinton, Manchester.

Holywell.—Houses (26), Bryn Mawr, for U.D.C.; F. A. Roberts, architect, Earl Chambers, Mold.

Horsham.—Houses (125), Compton's Lane (£166,866), for U.D.C.; Horsham and District Builders' Association.

Ilford.—Primary school, The Glade (£13,538); D. T. Jackson, Ltd., Barking.

Lancaster.—Junior and infants' school and central kitchen, Greaves Park estate; L. Lyons, city engineer.

Maldon.—Houses (30) for R.D.C.; A. R. Dannatt & Son, Council's architects, Prudential Buildings, Duke Street, Chelmsford.

Manchester.—Factory for G. Greenhalgh & Sons.

Newcastle-on-Tyne. — Machine and blacksmiths' shops for Selborne Domestic Engineering Co., Northumberland Gardens, Newcastle; J. Rowell, 5, Coniston Avenue.

Newcastle (Staffs).—New foundry for Potteries Foundries, Ltd.

Preston. — British Restaurant (£13,783); borough engineer.

Rochdale.—Houses (170) and bungalows (32); S. H. Morgan, borough surveyor, Town Hall.

Salford. — County secondary (municipal) school, Cromwell Road, Pendleton; W. A. Walker, city engineer, Town Hall.

Sheffield.—Extensions to works for John Bedford & Sons, Mowbray Street.

Dwellings (90), Parson Cross extension (£96,041); M. J. Gleeson, Ltd., builders, 822, Chesterfield Road.

Spenborough.—Permanent houses (60), Windy Bank; U.D.C. surveyor, Town Hall, Cleckheaton.

Teddington.—Film studio, Broom Road; Warner Bros., Teddington Studios.

Twickenham.—Houses (95) on the Mill Farm Estate, Hanworth Road; W. H. Jones, Town Clerk, Municipal Offices.

Urmston.—Houses (83), Stott estate, Flixton, for U.D.C.; J. Maunders & Son, Ltd., builders, Barton Road, Stretford, Manchester.

West Chirton.—Factory for Levine & Co., Ltd., Newcastle; architects, Arthur & Kirkup, 13, Swinburne Street, Gateshead.

Willenhall.—Girls' secondary school, St. James's Lane; Trustees of Bluecoat School.

Workington. — Factory, Salterbeck estate; West Cumberland Industrial Development Co.

Worksop.—Factory (£500,000), Carlton Road district; Bairnswear, Ltd., Nottingham.